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PLAIN HINTS
ON THE
DISEASES OF CATTLE IN INDIA,
BY

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GOVERNMENT AGRICULTURAL COLLEGE,
SAIDAPET, &c., &c.

SECOND EDITION.

Revised and enlarged with five plates.

Price Rupees Three.

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BOMBAY:
Printed at the "EXAMINER PRESS."
1884.

DEDICATED,

BY PERMISSION,

TO

**His Excellency the Right Honourable
GEORGE ROBERT CANNING, BARON HARRIS, C. C. I. E.
GOVERNOR OF BOMBAY,
AS A TOKEN OF RESPECT AND ESTEEM,**

BY

HIS EXCELLENCY'S MOST DUTIFUL SERVANT

THE AUTHOR.

CONTENTS.

	PAGE
Introduction	1
CHAPTER I:	
II. Indian Cattle	10
III. Selection of Cattle	15
IV. Breeding and Rearing	19
V. Food and Feeding	25
VI. Cattle Sheds	34
VII. The Structure and Functions of the various Organs of the Body	38
VIII. Health and Disease	46
IX. Nursing	50
X. Prevention of Disease and Cinerators	54
XI. Medicine and Medicinal Agents	62
XII. Contagious Diseases	72
XIII. Diseases of the Brain and Nervous System	80
XIV. Non-Contagious Blood Diseases...	82
XV. Diseases of the Respiratory System	85
XVI. Diseases of the Digestive System	88
XVII. Diseases of the Urinary and Generative Systems	96
XVIII. Pregnancy, Parturition and Parturient Diseases	100
XIX. Fractures, Accidents and Diseases of External Structures	107
XX. Cattle poisoning	115
XXI. Meat and Milk	119
XXII. Cruelty to Animals	123

APPENDICES.

No. I. Madras Act No. II of 1886 for the Prevention of the Spread of Disease among Cattle	126
II. Pasteur's Method of Protective Inoculation for Anthrax	132
III. Weights and Measures	136
IV. Act No. XI of 1890 for the Prevention of Cruelty to Animals	138
V. Table of Dentition of Cattle	142
Glossary	144



A. Skull.
 B. Lower jaw.
 C. Vertebrae of the neck.
 D. " Back.
 E. " Loin.
 F. " Croup.
 G. " Tail.
 H. Shoulder blade (scapula).
 I. Arm or forelimb (umerus).
 J. Forearm (radius & ulna).
 K. Cannon bone (metacarpus).
 L. Pastern bone (australia).
 M. Small pastern bone (coronae).
 N. Pedal bone.
 O. Tarsus.
 P. Thigh bone (Femur).
 Q. Thigh.
 R. Patella.
 S. Metatarsus.
 T. Ribs.

INTRODUCTION TO THE SECOND EDITION.

A second edition of my small work "Plain Hints on the Diseases of Cattle in India" has been called for, for several years. It was my intention on my arrival in India over three years ago to publish one, but, having had the honour to be appointed Principal of the Government Veterinary College, Bombay, shortly after my arrival, I found it impossible to devote the time necessary to this task, and even now I feel that this edition will not fulfil my hopes of being as complete as one would wish. The revision of the first edition has been carried out only after the legitimate labours of the day have been over. I, therefore, ask for every indulgence, should there be found in its brief pages any sins of omission or commission.

The importance of the diffusion of any knowledge, however meagre, likely to assist the ryot, either directly or indirectly, is of the utmost consequence, and I shall have been amply repaid for my labours, if I have even in a small way contributed to this all-essential end. It must never be forgotten that the cattle of India are the back-bone of agriculture, and their preservation should be classed as a national one. That India is essentially an agricultural country is clearly proved by the census of 1891, which gives the number of inhabitants engaged in, and connected with, agriculture as 175,381,239, adding to these the number of people engaged in general labour on the land and pasturing cattle, which stands at 25,468,017, making a total of 200,849,256 or 69.92 per cent of the whole population.

It is astounding, too, to see, irrespective of the enormous annual loss, estimated approximately at £6,000,000 sterling, from the ravages of fatal and contagious diseases, not to speak of deaths from ordinary diseases brought about through ignorance or the absence of skilled treatment, how few ordinary observers consider for a moment what the result of this loss means. It affects, the all-important subject, the revenue of this great Empire. The unfortunate ryot, in most instances, is unable to replace his cattle, or is compelled, which is but too frequent, to tie a mill-stone round his neck for the remainder

of his natural existence by having to apply to the wily Sowkar or money-lender for the wherewithal to purchase cattle to replace those that have died, or to let his land lie fallow and unproductive, consequently he is unable to pay the cess or land tax to Government and the revenue suffers. Then again, when disease devastates a whole country side, which is not unknown, plough cattle are not to be had even for money, with the result, that agricultural operations have to be suspended, and rice, the staple food of the people, becomes a dear commodity, and we have all the attendant miseries of scarcity, followed by high prices, and thus the people suffer from a want of a sufficiency of their natural food, lowering their vitality, and rendering them more prone to the inroads of disease.

Therefore, the careful preservation of the Cattle in India is a subject of the utmost importance. It is the main wealth of the country, and should be scrupulously regarded as such.

A glossary has been compiled and added so as to enable non-professional readers to understand the meaning of such technical words as it has been found compulsory to employ in the body of the work.

The appendices, I trust, will be found useful for reference.

*Government Veterinary College,
Parel, Bombay.*

THE AUTHOR.

INTRODUCTION

TO THE FIRST EDITION.

A plain practical work, written in simple language, and based on a knowledge of how Indian cattle live, both in health and disease, is much needed. This is not the first book on the subject of cattle diseases which has been written in India, but with the changes which have taken place in our knowledge of the diseases of cattle, and with the increased attention which the Government is now paying to this subject, in the interests of the public, the want of a fresh work for the information of cattle owners and district officials, has been many times forced on my notice in the performance of my duties as Inspector of Cattle Diseases.

It is worthy of note, too, that Agriculturists of various grades, especially the younger ones, are beginning to understand that something more is required than the simple acts of piety which they have hitherto depended upon in the treatment and prevention of disease, and in ensuring the general welfare of their cattle. This desire for knowledge is well shewn by the large, and yearly increasing size of the classes at the Agricultural College, Saidapet, and by the remarkable interest which the pupils display in all matters concerning the health of live stock. But few Agriculturists, however, can attend these classes, therefore I have written this work in the hope that by means of it I may extend my usefulness, as a teacher, to every hamlet in the Presidency.*

* Note.—This introduction was written in 1883 when the author was Inspector of cattle disease in Madras,

I also find that a book of this nature is 'much needed now because, at no time has cattle disease been so prevalent as of late years, or, to speak more correctly, the attention which this subject has recently received from Government has clearly shewn the enormous loss of valuable stock that every year takes place from this cause.

Something, too, is necessary for the purpose of enabling Government Cattle-Disease Inspectors, to obtain from cattle owners that aid which is absolutely necessary for the thorough performance of their duties. When those in charge of live stock are able to tell whether their animals are sick or well, and know what simple steps should be taken, *directly* disease breaks out, to prevent it spreading, then, and not till then, shall we be able to thoroughly get disease under control.

In the hope of giving this knowledge I write a very simple account of what I consider every village or district official, and cattle owner, should know about the most frequent diseases which affect cattle in this country.

It is much better to follow a few simple rules, such as I shall lay down here, in the feeding, shelter, and general care of animals, than to do nothing, with the idea that all losses are due to causes beyond control; for it has been clearly shewn, that *disease results from want of good management, and that animals properly taken care of will remain in health.*

There are two things to which attention must be paid in this connection. Firstly, that the animal gets good food, water, shelter, and air; and secondly, that he be prevented from taking disease from other cattle. Both these objects may be readily gained by paying attention to the instructions which I give below:—

1st.—Food must, as far as possible, be sufficient in quantity, of good quality and not too difficult to obtain. Most Indian cattle select their own food from the grazing grounds of the village during the day, and when they are brought in at night some are given paddy straw, and other foods. Instinct usually enables animals to decide what is good for them, but often a drought has so dried up the herbage that cattle have to appease their hunger by eating whatever they can find. When all grass is dried up cattle may be seen eating the bark of trees, and prickly shrubs, and poisonous plants, which at other times they would refuse. Such food is a frequent cause of disease, particularly indigestion, and poisoning. When the rains set in, coarse grass and rank herbs grow in abundance all along the edges of rivers and tanks, which are very dangerous to cattle, as such food when eaten is liable to produce colic, gas in the stomach, and diarrhoea, and some of the rank herbs are very poisonous. Thus, we see that too little or too much food may cause disease, therefore the supply should be so managed as to insure enough in dry weather, and not too much in the rainy season. The best way of regulating this is by storing fodder when it is plentiful, so as to make up for deficiency in dry seasons and famine years ; *this would be one of the most important means of preventing cattle disease in India.*

With regard to the quality of food, it must be remembered, that the serious disease known as *dysentery*, which is very frequent in all parts of India, is always caused by coarse and bad forage, whether obtained by cattle at pasture, or given to them as fodder. Mouldy food is also the cause of disease.

In dry seasons, it is most difficult to obtain food from pastures. An ox will live on stubble, coarse

grass, and other foods which would not support most other animals, but even these can be obtained only after many miles of wandering, which means that almost more power is thus expended than is compensated for by what little food they can pick up. Not only does this prevent the animal from thriving, but actually it weakens him, and so makes him liable to attacks of contagious diseases, if he be in any way exposed to them : for it has to be remembered, that, *outbreaks of disease prove much more serious among badly kept and weak animals, than amongst those which are well fed and cared for.*

2nd.—*Shelter.* Owing to the scantiness of food during dry weather, cattle have to spend the whole day exposed to the sun picking up whatever they could find in the dry pastures and are prevented from even obtaining rest for the purpose of *chewing the cud.* The animals thus become liable to disease. Whenever possible they lie down under the shade of trees, or a shed, and chew the cud or sleep during the hottest hours of the day ; but hunger is apt to prove more pressing than the need of repose. Not only has *great heat* to be guarded against, but also cold. I wish it, however, to be plainly understood, that *cold in itself does not cause many diseases, it is rather the sudden changes from heat to cold, and from cold to heat that cause disease* ; we see this in the frequency of sickness during the months when the days are fairly hot but the nights are cold, or damp and cold following a period of hot weather. Therefore, it proves to be of considerable advantage and a great saving to shelter animals from cold winds and heavy down-pours of rain. When sheds and other means of shelter are provided, cattle thrive better and seldom die from disease ; thus, although the cost of providing shelter may in the first instance entail a certain outlay of money, the

improved condition of the stock is a good return for the expenditure, and it has been clearly shewn that whether in the production of milk or meat, or in the performance of work, less food is required by animals which are properly housed than by those which are not cared for.

3rd.—*Water.* It is a well known fact among breeders of the enormous fat cattle of England, that unless bullocks be freely supplied with water they will not readily fatten; but unfortunately, in India, this very element, water, is often wanting; sometimes as a result of extreme dryness of the season and often through carelessness on the part of the cattle owners. A deficient supply of drinking water, is a very frequent cause of indigestion. On the other hand, it is found that grass too full of water, such as that growing at the margin of tanks or the banks of streams, or that springing up plentifully during the rainy season, is perhaps the most frequent cause of *hoven*. Hard or bitter water is often a source of colic; and the lime salts contained in such water sometimes give rise to stone in the bowels.

When the monsoon sets in, the rain water carries large quantities of filth of all kinds, down into the tanks, especially those in the vicinity of badly drained dirty villages; such water is quite unfit for animals to drink. Wells are much less liable to be contaminated in this manner, as water filters into them through the soil, which has the power of retaining refuse matter. When the tanks are full the large amount of water serves to dilute the refuse filth, besides a portion settles at the bottom; but towards the end of the cold season, and throughout the hot weather, the water gets very low, and the tanks in many cases change into dry, or half dry mud. It is no wonder that such water drunk by thirsty cattle, gives rise to severe disease in them.

4th.—Ventilation. The importance of pure air for the breathing of animals should be carefully borne in mind. Shelter is good, but to shut up an animal in a place where fresh air cannot enter, and from which foul air cannot escape, is sure to bring on disease sooner or later. *Every cattle shed should, therefore, have many openings both at the floor and in the roof*, the former to let in fresh air and the latter to allow the escape of foul heated air, such as is thrown out by the animals in breathing.

A very common cause of unhealthiness of cattle sheds, is the accumulation of filth of all kinds on their floors. The sheds are sometimes not cleaned for months together. This is wilfully bringing about disease in the animals, and so long as such practices exist it is not surprising that disease in this country carries off whole flocks and herds.

5th.—Communicable diseases. We must now consider how diseases of animals are handed from one to another, and the best means of preventing such communication.

There are three ways in which these diseases may spread, viz:—by contagion, infection, and inoculation.

(a) *Contagion*,—that is by actual touch, such as when a diseased animal meets a healthy one, or when anything which has been used in nursing a sick animal is brought in contact with a healthy one. Such wild animals as jackals, vultures, kites, bandicoots, or even flies, may also carry diseased matter, and it has been proved by Cattle Inspectors that even men, who have an interest in obtaining hides of cattle, are depraved enough to carry the discharges of diseased animals, and scatter them over the pastures where healthy cattle are likely to graze; such villainy must be strongly repressed, by law, whenever it can be traced home to the

culprits. We have also to remember that contagious diseases may be spread by the attendants on diseased animals, by healthy beasts which have been working with, or feeding amongst, the sick, by men who are trying to cure those which are sick, by carts in which the sick have been carried, or through the dung, bedding, or carcases of diseased animals. Skins, too, are a source of great danger, and there can be no doubt that they are a very frequent cause of outbreaks of cattle disease. We must ask ourselves, how it is, that in the ordinary cattle trade of this country, disease is spread in consequence of its being contagious? Cattle turned out during the day to graze are liable to mix with others, and thus if disease be present it is communicated, some are apt to get lost, and stray great distances among the cattle of many other villages, and, perhaps, find their way at last into the village Pound where they remain, probably, ill kept and half starved, until claimed by the owner. If such a straying beast be affected with cattle plague, or any other disease of a communicable nature, an enormous amount of mischief usually results. It is the duty of the village officials and Police, to see that Pounds are constantly kept clean and *disinfected*. The manner in which it should be carried out will be explained hereafter. Unless this duty be well attended to, Pounds prove a source of great mischief. Every care should be taken to prevent animals straying from one pasture run, or village common, to another, and all strange animals should at once be put in the Pound.

The ponds or tanks at which cattle drink are other sources of spreading disease. Animals are compelled to collect at them and so meet one another; often indeed the owner through ignorance, or a wish to conceal disease from the Inspector, leaves his diseased animals in water all day long, and thus

removes all chance of any of his stock remaining healthy. When cattle are collected at night and shut up in yards in the village, or sometimes in the owner's house, with scarcely sufficient air for breathing, and not enough room to move, the healthy cannot avoid contact with the sick. I cannot speak too strongly against this practice, which is to be noticed throughout the whole of India. To herd animals in dwelling houses is bad for the health of both man and beast, as there are some very serious diseases which may be conveyed from animals to men, and especially to women and children, in this way.

Again animals are taken long and wearisome distances by road, either to Fairs and Markets or for private sale. If they become diseased they are apt to give the disorder to all animals along their line of march, and one flock or herd may cause disease among all animals in a Fair or Market, from which it may be spread throughout the whole district, when owners carry their newly bought animals home.

Cattle trains, unless thoroughly kept clean and disinfected, may spread disease, for, animals weary with travel and want of food and water, are very apt to take any sickness which has affected those having last travelled in the same trucks.

One of the most serious causes of the spread of contagious diseases, is the carelessness, ignorance, and laziness of those who have charge of them. We can tell the best means of stopping the spread of these diseases, Government help is given to cattle owners to save their stock, therefore, there is no excuse for ignorance; but if a man is so careless or lazy, that he will not try a few simple means of checking disease, he certainly deserves to be punished.

(b.)—*Infection*—is a more difficult matter to deal with than contagion. *It is the conveyance of disease through the air, from one animal to another.* It is quite essential that in cases of infection, healthy cattle should be kept a certain distance away from the diseased. Experience has shewn us that, whether by the action of winds or otherwise, certain diseases may be conveyed some distance through the air. Five hundred yards is a safe distance to keep healthy animals from the sick, but more shall be said about this hereafter.

(c.)—*Inoculation*—is familiar to us in the form of vaccination, by which a disease of the cow is communicated to man through the introduction of some diseased matter into a wound. Some diseases are neither infectious nor contagious, but can be conveyed in this way; they are less dangerous than the more easily communicable forms of disease. Of "inoculation diseases," three are very important, *Anthrax of cattle, Glanders of the horse, and Rabies or Madness of the dog.* Almost all communicable diseases can be conveyed by inoculation in their most severe forms. Anthrax and Glanders can be communicated, if carcasses be cut up after death by any one with unprotected wounds on their hands. A wound is not always necessary for inoculation, as sometimes the poison may be taken up by the membranes lining the body, such as that of the nostril, eye, or mouth.

We have now seen that, both simple and communicable diseases can be prevented by care and management, attention to the laws of health, and to the rules for the prevention of contagion and infection. Whoever neglects these simple means of preserving the health of his cattle perhaps deserves to suffer.

CHAPTER II.

INDIAN CATTLE.

India is a vast country and the variations in its climate and soil are as numerous as those of the continent of Europe. No less numerous is the number of distinct races inhabiting the country, each having its own peculiar customs, forms of religion and language, and above all, its time venerated processes of husbandry.

As regards Cattle it may be said that the whole agricultural wealth of the country depends on them. In the West mechanical skill and a knowledge of machinery have not only reduced agricultural operations to an art requiring a minimum of labour, but have tended to deviate the energies of men in other directions than agriculture, and made manufactures as important or in some cases more important than the actual cultivation of the soil or the raising of stock.

The Indian cultivator whether he raises grain or fruit, fibres or dye stuffs, has to depend on his Cattle for carrying on his work. This dependence is not a recently established one, but was a recognized institution from time immemorial, for even in the pre-Vedic times, the husbandmen who had large flocks of cattle were considered to be the most important members of society.

The veneration in which the cow is held among the majority of the inhabitants of Hindustan, may also be rightly attributed to the fact of the important part cattle had to play in the economy of the country and the wise lawgivers perhaps found it a better and a surer expedient to associate the cow with religion in order not only to prevent the reduction in numbers of

this important wealth of the country, but actually to aid in its development.

Without going into questions of natural history, I may mention in passing, that up to recent times the ox tribe existed in a wild state in different parts of India and to a less extent are met with even at the present day in the large forests of Assam and the vicinity of the banks of the Brahmaputra river. A few are also occasionally met with in the forests of the Peninsula.

In the same way as we find variations of soils and climates we too find great variations in the breeds of Indian Cattle, for it is well known that animals adapt themselves to their surrounding conditions. It has also to be noted that in Mysore, Hissar, &c., where some attention has been paid to breeding, we find other variations brought about artificially.

A knowledge of the principal breeds of different Indian Cattle, their characters and the conditions under which they live, cannot but be of use to the cattle-owner of this country, for whenever he may be inclined to improve his breed of cattle or select and breed such animals as would be in immediate demand in his locality, whether as milk suppliers or draught beasts, a knowledge of the different breeds must help a great deal in enabling him to procure more readily what he requires.

I give below an account of some of the principal breeds of Indian Cattle with the localities in which they are procurable, their distinguishing characters, as well as the uses for which they are known to be best adapted :—

1. *Nellore*.—This breed of Cattle is found in the Madras Presidency. They are of heavy conformation and average 60 inches in height measured from the top of the hump. The Nellores have a broad

require much labour and more space than I could possibly spare in the course of this work, but is fraught with great difficulties on account of the almost innumerable slight variations and hybrids we meet with here. In my list I have included one foreign breed, the Aeden for various reasons, particularly on account of the great favour in which this breed of animal is held in India.

Cattle are used principally as draught animals and milkers in this country. Of the typical breeds the best milkers are the Nellores, Hissars, Gujeratis and Sindies. As draught animals, the Nellores Mysores, Gujeratis and Deccanis stand prominent.

In any attempts at the introduction of cattle of a particular breed from one locality to another, an important point which should be borne in mind is that animals thrive best in climates and conditions similar to that of their native land, and if there be a great variation in this respect it would not only be mere waste of time and money to attempt to introduce them into unsuitable localities, but would end in great disappointment. As regard cross-breeds and the possibility of improving various breeds by judicious crossing and adapting them to different localities, more will be said in the section on Breeding.

CHAPTER III.

SELECTION OF CATTLE.

In the selection of cattle the most important thing that has to be borne in mind is the purpose for which the animals are required, a purchaser may under ordinary circumstances require them for :—

- 1—Stud bulls.
- 2—Milch cows.
- 3—Draught animals :—
 - (a) Cart.
 - (b) Trotting
 - (c) Plough
 - (d) Irrigation
- 4—Pack work
- 5—Beef.

General Examination.—The points that have to be sought for depends on the particular use for which the animal is required. However, there are certain general characteristics which are indispensable in an animal which one seeks to purchase, these may be summarised as :—

- (a) A certain amount of tractability.
- (b) Proper eye-sight
- (c) Absence of deformities
- (d) Absence of disease.

In selecting an animal for beef perhaps the last is the only one of importance.

STUD BULLS.—Leaving aside the general conformation of the animal which it is no doubt the duty of the selector of a stud bull to look to principally, for the present we shall confine ourselves strictly to the examination as to soundness. The first thing that should be looked to, is the age. The age of

cattle can to a more or less extent be accurately found out till they are five years old, from the appearance of their teeth. If one examine the mouth of a living animal or that of a skeleton, two different kinds of teeth will be observed, one kind has sharp cutting edges, and the other, broad surfaces for the grinding of food.

The sharp teeth are placed in front whilst the grinders are in the jaws. In the ox tribe we find only one row of these sharp teeth, situated on the lower jaw of the mouth, whilst on the upper jaw their place is taken by a pad of a hard substance. In a fully developed mouth there are found eight of these cutting teeth (incisors.)

As in children so in calves too, we have milk teeth which are shed after a time, and whose place is taken by permanent ones. The milk teeth are very white and marked by ridges and they are set in the gums only superficially. At birth; we have generally only the four central teeth, and the other four appear within three weeks after birth. The permanent cutting teeth begin to appear as follows:—

The central two at	1 year, 6 months.
The next two at	2 , 6 ,
The next two at	3 , 6 ,
And the corner two at	4 , 6 ,

These data enable us to give the age of an animal from its mouth till it is five years old. When above this age the observer must be guided in ascertaining the age from the general appearance of the animal, but for the most it is only guess work.

Bodily defects.—An animal with any bodily defect should not be selected at all. Of these defects, particular attention should be paid to the examination of the lungs, testicles, horns, eyes and limbs.

Disease—It is unusual for any person to exhibit for sale a thoroughly diseased animal. However, great care should be taken in examining well and satisfying one's self of the absence of disease—(The various diseases to which animals are subject to will be dealt with in the course of this work).

MILKERS.—In addition to the examination as to age, defects and disease, a milker should be examined

(a) *As to its docility.* A vicious cow however good she may be in other respects is almost useless.

(b) *Formation of the udder,* absence of any hardening or inflammation, also abnormal growths and thickening of the milk ducts.

(c) Whether the cow is a slinker, if such information can be got.

(d). The quantity of milk given.

DRAUGHT ANIMALS.—In the examination of draught animals, in addition to the general observations, special attention should be paid to the condition of the horns whether diseased or broken. The neck, whether there is any tendency to soreness. The back for strength, the limbs for their formation and the absence of any bony growths, and last, not the least, the hoofs to see that they are not tender or deformed.

It may be well here to note that all new purchases, whether they be bulls, cows or bullocks, should under no circumstances be admitted to one's flock until they have been kept separate for at least 7 days, for as will be described later on, there are many dire contagious diseases which are capable of being conveyed to other animals, existing latent for days together.

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In purchasing animals, especially cows, care should be taken to escape the tricks of the sellers, for it often happens that in showing off the quantity of milk a cow yields, various methods are adopted to show an apparent increase.

Hefting is one of these when the teats are kept plugged for a time so that the milk may collect in the udder.

Sometimes the milker puts a little salt in the vessel which he takes to receive the milk, and when the freshly drawn milk mixes with the salt, there is a tendency to froth, and the froth of course shows the quantity of the milk to greater advantage.

Blowing air and salt-water into the womb (Uterus) is supposed among the natives in some districts to increase the lacteal secretion and hence they secretly resort to this cruel plan of showing an increase in milk.

CHAPTER IV.
BREEDING AND REARING.

There are some things very generally known, but very seldom acted upon in the breeding and rearing of stock, and in this chapter I want to draw attention to them. The breeding of animals in India has for a long time been worked without any system, or method; indeed, things have been pretty nearly allowed to take their natural course. In consequence of which neglect, and carelessness on the part of owners, the breeds of cattle, sheep, and horses, indeed of all kinds of stock, have sadly diminished in size, shape and value.

It must be remembered that "like produces like." The cattle from which you breed will produce young animals, which will become like themselves in shape and qualities. Thus *animals which are used for breeding must be suited to the particular district, and able to thrive well in its climate.* It is of no use to bring large English bulls and distribute them throughout India; they would be so affected by the heat as to be unfit for breeding. On the other hand, Aden stock and bulls brought from some of the most celebrated cattle breeding districts, may prove very useful, and when "crossed" with cows of the district, improve their milking, working, or meat producing qualities.

Young animals which have not yet completed their growth must not be allowed to breed. The small size of many Indian breeds, has undoubtedly been brought about by a neglect of this rule. Stunted progeny is the result, which in due course produces still smaller animals. There is much danger of this under the ordinary method of cattle management in this country. Directly the young female feels inclined to breed, the male covers her, and thus she becomes big with young before she has strength enough to support the calf, or to give enough

milk to it after birth. Consequently, the growth of the mother is prevented, so that the unborn young may get enough nourishment to keep it alive. Much harm is done to males by allowing them to cover too early, and too freely, they become very uncertain getters of young, and are very early worn out and unfit for breeding. They, too, become thereby stunted in growth, and apt to beget small and unhealthy offspring.

Ugly mis-shapen animals are not to be bred from. The great danger here is, the perpetuation of an ugly useless breed instead of a useful one, the former being quite as expensive to feed and rear as the latter. Such breeding is, therefore, very foolish and a direct waste of money, time, and trouble.

Males which are not suited for breeding may be prevented from doing much mischief by early castration ; they are still useful for work, and their flesh is improved by the process, and they grow to a large size. All "weedy" or useless male animals not fit to breed from, should be castrated before they have an opportunity to cover. In spite of religious objections on the part of some natives to the removal of the testicles, castration of animals of all kinds is spreading, because, its good effects are so well marked. It is essential to the improvement of stock in a district, that castration be carried out under due supervision and with judgment, so Government educates men in the performance of this very important operation, and sends them out into the districts for the benefit of people, who have the sense to see the good, castration does to their stock.

There are a great many diseases which can be handed down by parents to their young, just as a badly shaped sire will beget bad progeny, so will a diseased parent produce stock either diseased in the same manner, or very liable to take disease of any

nature. Therefore, *animals used for breeding purposes, should be sound and free from disease.* This rule must be especially attended to in breeding all animals. Again, if parents be too old and worn out, they will produce weakly and small young, not worth the risk and trouble of breeding; therefore, *only animals which are mature and vigorous, free from disease, and well made and suited to the district, should be bred from.*

The *sire* or male parent, must be a mature animal, and able to cover properly. His defects are much more serious than those of the female, because of the number of animals of which he can be the parent. There are a few diseases which may be spread by sires. Thus, *Gonorrhœa*, or Inflammation of the Penis, may cause a similar disease of the organs of the female, with which the diseased parts come in contact. Again male animals suffer from a communicable disease of their genital organs, which they can convey to the female, but it is not the same as syphilis of men. A bull lent for breeding, too, may convey some of the communicable diseases already described to the females, which he temporarily lives with.

The *dam* or female parent, should be mature and strong enough to nourish the young, before and after birth. She should have large well developed breeding organs, and a healthy desire for the male coming on regularly. She should be a free feeder, a good "doer," and have a good temper. Then she will make a good mother. After she has been successfully covered, she should be well nourished, and taken care of, and kept apart from riotous animals, especially towards the time of birth. She should not be brought among other females producing young, nor should she be over-driven, or over-fed, otherwise she will be apt to "slip" or "abort" her young. This is in some years a most serious loss to

cattle owners, and is caused through either famine or the development of blights and mould on the herbage used as food. It may also be brought on, by the mother smelling at the membranes of the young of another female, lying about or hung on a tree to charm away disease.

There are two things which ought particularly to be remembered at the time of *Parturition or Birth*. Firstly, *the strength of the mother is to be kept up in every possible way*. Secondly, *the efforts of nature must not be interfered with, nothing must be done, except what clearly serves to assist the animal*. If the young animal is not born readily, an examination should be very gently made to see if the position is natural, the young should have its head and two fore legs projecting, and gradually pushed further out by the straining of the mother. Often the complete process of birth is slow, and the animal will require a dose of arrack to support her strength. It is quite right to put the young animal into the proper position, if it is not already so, but *all dragging with force for its removal must be avoided*. Or the whole womb may drop and so very great mischief be caused. If this accident takes place, the part must be returned as well, and as quickly as possible, and the patient supported by nourishment. The accident depends on the weakness of the mother, or cruel efforts to drag away the young. The young animal while in the womb is surrounded by certain membranes. One of these comes away at birth, but the others only some time afterwards.

Retention of the Membranes, is not such a serious matter as is generally imagined, they will come away in good time if left alone, and even when detained for some time do no mischief. Whenever an attempt is made to remove them, no force must be used, or serious bleeding from the womb, or even dropping of that part, may take place.

Dropping after Calving, is a kind of paralysis and prostration which occurs in well bred cows (especially good milkers), and generally with the third or fourth calf. Many diseases are mistaken for this, which is very seldom seen in India; except among imported cows. I need not deal with it further than to say, that in an emergency of this kind, the cow must be given stimulants, frequently and in moderate doses, with careful nursing.

REARING — It is a very common error to stint young animals of food, and let them shift for themselves; their growth is thus prevented, and they are made liable to disease. In this country, too, care must be taken that calves, be dropped at the right season of the year, when their dams may get sufficient pasture, and so that there may be delicate nutritious grass for the young ones themselves, when they begin to feed. Whenever possible, the young should get their mother's milk, and they must be allowed a free run, in order to secure full development of bone and muscle. *The system of hobbling and tying up young animals is one of the curses of stock rearing in this country.* It causes the legs to be deformed, weakens the animal, and makes it quite useless for many purposes. Some other method ought to be adopted to prevent animals from roaming, and castration would be generally sufficient to prevent males from doing mischief.

There are three diseases frequent and fatal among young cattle of this country, which I must here allude to.

Navel ill, caused by the cord running from the young animal to the mother, being broken off too short at birth, or from other calves sucking at it, or from the calf being tainted with that horrible disease *Tuberculosis*. The calf may be purged by giving a little salts

to the cow, and the navel well bathed with hot water, and alum applied to it.

Scour—is diarrhoea of calves, if it comes on when they are living on milk, the matter passing from the bowels is white ; but sometimes it sets in first when the young animal is commencing to eat a little green food, it is then of a green colour. In either case, the calf must be nursed carefully, given plenty of rice congee, and some chalk, ginger, and chillies (of each a drachm) every day.

Hoose or Husk—is a danger of much older calves, and is an inflammation of the lungs, caused by worms collecting in the air tubes of these organs, and so weakening the animal. There is a very troublesome cough present. A number of young animals are affected at the same time, and some die from exhaustion. In this, as in other parasitic diseases, the patients must be carefully nursed, and their strength sustained in every possible way. For poisoning the worms in the lungs, a Veterinary Surgeon will make the calves breathe a poisonous gas, called Chlorine, but the process is too dangerous to be carried out by the ordinary cattle owner.

CHAPTER V.

FOOD AND FEEDING.

In the treatment of cattle and in the preservation of their health or in obtaining from them the necessary amount of work or meat and milk, proper food and a rational method of feeding is of the highest importance.

In considering this subject we have not only to bear in mind the available food supply of a district, and the amount which is necessary for certain animals for a given purpose, but the cost of these materials, and our aim should be to obtain the cheapest with the greatest advantage to the animals which are fed.

Chemists divide the constituents of food into four classes, viz :—Nitrogenous materials, Starch and Sugar, Fat, and Mineral substances. The animal body is also composed of nearly identical materials, and in the feeding of an animal his requirements of these for the maintenance of body heat, reparation of waste, and the building up of his frame have to be borne in mind.

The maintenance of body heat.—A living body maintains a certain amount of heat, and for this purpose every animal requires a supply of fuel in the shape of food. Fatty and starchy matter in the food generally have to meet this requirement.

The reparation of waste.—Every movement of the animal body, and every expression of energy is followed by a certain waste of material of the body and these have to be constantly replenished. In addition, a working animal wastes as much tissue as the energy expressed by him. Nitrogenous food meets the requirements of tissue waste.

The building up of the frame.—In addition to the replacement of wastage, every animal up to a certain age

has to build up its frame. Young animals require more material for the construction of their frames than old ones. Mineral matter in the food goes generally to the building up of the frames of animals.

All these materials in the proportion as required by a grown up animal are found in good hay. But according to the conditions under which an animal is kept he requires variations.

It has also to be borne in mind in feeding, that however large a quantity of one material we may supply, an animal is not able to take up more than what is necessary for him, any additional quantity supplied, will be mere waste. Now taking hay as our standard food, we may broadly say that a working animal requires in addition a quantity of nitrogenous food; a fattening animal, oily and starchy food, a milch cow, both oily and starchy and a proportionately small quantity of nitrogen, and a growing animal a food containing such mineral matter as lime, phosphoric acid, &c.

The supply of food.—Cattle food in this country consists of grasses, straws, legumes and pulses, roots, oil-cakes, cereals and brans.

Grass.—A grass may be natural or cultivated; natural grasses are abundant just after the rains; there are varieties of such grasses, but a few of these are only really good. However, for want of anything better, the village cattle have to take up whatever they can get. The best wild grass in India is Doob, or Hariyali (*Cynodon Dactylon*). The chief cultivated grass in this country is Guinea grass (*Panicum maximum*). Certain cereals such as Jowari (*Sorghum vulgare*) and Bajri (*Penicillaria Spicata*) are grown as grasses for feeding cattle. The legumes Lucerne (*Medicago Sativus*), and Chick Pea (*Cicer Arietinum*) are also grown as grasses.

Straws.—A great variety of straws is utilized in this country for cattle feeding; some of these are hardly of any value. The straw of Rice (*Oryza Sativa*), Kurakkan (*Eleusine Corcana*), of the various Sorghums, Panicums and Setarias, also the stalks of Indian corn (*Zea Mays*) form tolerably good cattle food when mixed with other materials.

Legumes and Pulses.—These are foods containing a large quantity of nitrogenous material. The principal Indian legumes used as cattle foods are Oorid or black gram (*Phaseolus Radiatus*), Mung or green gram, (*Phaseolus Mungo*), and other varieties of *Phaseolus*; the Kultie or horse gram, (*Dolichos Biflorus*), Dhal or Pigeon Pea (*Cajanus Indicus*), Gram (*Cicer Arietinum*), varieties of peas and sometimes *Lathyrus Sylvestris*, Kesheri Dhall, a very questionable food material as it is said to cause paralysis in those animals which consume it.

Roots.—Roots are not a well recognized cattle food in India. The Manioc (*Manihot Utissatissimum*) may with advantage be grown as a cattle food, besides carrots, turnips and mangolds could be grown where the climate is suitable.

Oil-cakes.—These are most valuable food for working cattle and milch cows; we have a variety of oilcakes in India which are comparatively cheap: Gingelly (*Sesamum Indicum*), Groundnut (*Archis Hypogea*), Kusumbha (*Carthamus Tinctoria*), Cocoanut (*Cocos Nucifera*) are some of the common kinds.

Seeds and Cereals.—Of the seeds which are given to cattle, cotton seed (*Gossypium*) is pre-eminently an Indian food, and milch cows are all fed with great advantage on it. Of cereals the various kinds of Jowari (*Sorghum*), Bajiri (*Penicillaria*), and Barley (*Hordeum*),

strongly recommend that it should get an extensive trial, with a view of finding out a simple mode of carrying it into effect throughout the whole of India.

The grasses, most suitable for storing are the following: Raggy, Cholum, Imphee or Planter's friend, Maize, Paddy, Tenney, Shamy, Varagoo, Cumboo and the Rumna grass of the Deccan, which grows to great perfection there.

After full inquiry into the subject, I have come to the conclusion, from my knowledge of India, that the two following simple methods seem to me best adapted for the requirements of this country.

First, a simple hole, pit or silo should be made with the following precautions. The situation must be selected for dryness and have the natural advantage of self-drainage. If these are not procurable, and where the locality is noted for dampness, a disused hut, well raised from the ground, might be utilized. It is of little consequence what size the pit is, provided it is built on the same lines as the following dimensions I now give. At the top 16 feet long, 11 feet wide, and at the bottom 15 feet 8 inches long, 10 feet 8 inches wide, and 10 feet deep; the capacity of this pit would be about 1,715 cubic feet, and would hold about 177 candies weight of fodder or 3,540 Madras maunds of 25 lbs. each.

Secondly, on the other hand, if the country, in the vicinity of farms or villages, be of an irregular hilly nature, advantage must be taken of the raised portions of ground or mounds, which will thus ensure thorough dryness of the silo or pit, and in my opinion this plan would be far more preferable to those sunk below the surface.

The method of storing the forage in the silo is as follows:—

Firstly.—The grass, or green crop, proposed to be stored should be reaped or cut when in flower, and when cut it must on no account be put into sheaves or bundles, but should be opened out and spread on the ground.

Secondly.—Before placing the grass in the pit, it has been proved from practice that it is advisable to line the sides and bottom of the pit with straw.

Thirdly.—The grass first cut should be the first to be laid at the bottom of the pit, to the depth of about one foot. I may here remark that the grass in every case must be laid regularly and level.

Fourthly.—Should the fodder be of a coarse nature, it ought to be cut up or chopped, so as to enable it to be well compressed, as if it be put in whole, its elasticity would allow the accumulation of a certain portion of air, and thus prove fatal to the ensilage, and bring about decomposition.

Fifthly.—When the first foot or layer of fodder is put at the bottom of the silo, it should be well rammed or trodden down, especial care being taken to attend to the sides; in fact, one man at least should be told off to particularly see to the sides being well kept down, the object of this is to equalize the pressure. Over this first layer a good sprinkling of salt must be laid, and then a layer of at least two inches of chopped straw or bhoosa; this same process may be continued on until the pit is filled. It is, however, not necessary to fill it up at once, but several days may be taken over the work.

No fear may be entertained of undue or destructive heating, as each fresh layer seems to partially arrest the fermentive process in the one underneath it.

There is no objection to the grass being stored in the silo whilst wet or during the rains, provided it is

freshly cut and not in any way decayed. When the pit is filled and well trampled or rammed down, a layer of straw about a foot deep, should be put. It is best if a wooden top composed of strong planks could be placed over this, but should it, as I fear be impossible to procure a plank top in the villages, I would recommend that two pieces of tattie, composed of stout and well-knit bamboos, be made the exact size of the mouth of the pit, and between them be placed either a double layer of thick bamboo matting or straw.

We now come to the amount of weight required to ensure sufficient pressure on the mass of stored forage. I do not believe, nor do I think, it is at all necessary that enormous weights are required to procure the desired pressure, provided the instructions given as regards filling, &c., have been carefully carried out, because it has been proved, as a fact, that when air is excluded from even wet grass, or other green food, plants of a fungus nature, which form and produce decay, will not develop themselves. The theory of this is, that if the air is forced out by the compression of the material, the continued action of the weight prevents the formation of new air spaces, thus the fungus cannot grow, and the material is in this way preserved. The next thing for consideration is the amount of weight required, and of what substances they may be composed so that any expense on this account may be dispensed with. We are told that earth piled on to give a weight and pressure of 500 lbs. to the square foot is necessary; now, as a cubic foot of ordinary dry earth weighs $\frac{3}{4}$ cwt. or 3 maunds 9 lbs. (Madras), it would mean a mound of 5 feet high, over the pit we have described. If possible, some other means of obtaining the desired pressure must be adopted as this large amount of earth would be most

ineconvenient. The different weights generally used in England, and other countries, are blocks of concrete, iron, and sacks or bags filled with earth, but I would recommend that stones or slabs, if obtainable, packed closely together on their ends, or baskets filled with stones, be used, and a pressure of from 1 to 3 cwt. each to the square foot be given.

Of course, if the grass be fine or chopped up, less weight will be required than with coarse strong fodder. To exclude rain and moisture, it will be found necessary to throw on, after the weights are placed, a quantity of earth sufficient to completely cover, or hide, the stones from view which should then be either lapped over or thatched.

A pucca silo insuring its contents against the ravages of white ants and other insects may be erected by digging the pit as described above and lining its sides and bottom with a single layer of bricks and mortar ; this should then receive a covering of at least two inches of chunam, or any hard cement. Care being taken that the corners are strong and carefully built.

CHAPTER VI.

CATTLE SHEDS.

Cattle sheds are of use in this country especially during the monsoon rains. The practice of tying cattle in dwelling houses, as is done in many agricultural villages, is fraught with great danger both to man and animals. Shelter from the rays of the sun during the hot parts of the day is a necessity for the well-being of animals, but this shelter need not always be provided by housing cattle. If animals are housed for an unusual length of time, depriving them not only of their grazing, but of fresh air and exercise, they would no doubt suffer. It is of great importance, that there should be large trees or hedges, where cattle are grazed, so that they may rest under their shade whenever they are inclined to do so. In places where there are no such trees, they should undoubtedly be planted. The presence of trees does good in more than one way ; in addition to their being useful for the thriving of stock, trees prevent the excessive evaporation of moisture from lands, and the people living in the neighbourhood are specially benefited. Cattle sheds are useful in giving shelter to animals during the night and during heavy rains and hot days. They need not be built in a costly style,—a simple shed with a thatched roof and wooden posts or mud pillars is ample for ordinary requirements.

A cattle owner in many instances will have to build the sheds according to the area of land at his disposal. If he could command the land as in the districts, the sheds should be built to accommodate a single line of animals, or a double line with a passage in the centre. A shed for a double line of animals should have its roof about sixteen feet high from the ground along its central line and the two sides sloping in either direction and

ending at a height of about ten feet from the ground. The breadth of the sheds may be fifteen feet. This divided into three equal parts of five feet each may be utilized as follows: The two side spaces for cattle stands and the central portion for a passage of two feet in the middle, leaving one and a half feet on either side for the construction of mangers.

The pillars whether wooden or built of mud should be six feet apart. The length of a single cattle shed should not exceed 50 feet; but it may be less according to the number of animals to be accommodated. If there be a large number of animals, instead of attempting to put them all in a single shed, several sheds should be made. Each animal should have at least five feet of space, so a shed fifty feet long would accommodate ten animals in each row or twenty animals in the two rows of the shed—each animal would thus get 600 ft. cubic space.—Height 16 ft. \times breadth 15 ft. \times length 5 ft. = 1200 cft. for 2 animals or 600 cft. for one.

The shed should be open on all sides without any wall, and during the monsoon rains the side from which the wind blows may be provided with bamboo or leaf tatties.

Floors.—The floors should be built about a foot higher than the surrounding ground, and be made of non-absorbent materials, cheap and at the same time capable of being dug up once or twice a year and relaid—for there is nothing so dangerous as an absorbent floor and one which is permanently built so as not to admit of its being renewed when necessary. A very good material for laying the floors which I have found out by experience is one made of equal quantities of quick-lime, clay, and brick dust finely powdered, sifted and mixed together. This should be laid on a bed of gravel, six inches in depth. There should be as

CHAPTER VII.

THE STRUCTURE AND FUNCTIONS OF THE VARIOUS
ORGANS OF THE BODY.

If we look at an ox, we see certain parts of its body ; we have the head in front, with a pair of horns, ears, eyes, nostrils and the mouth. In the mouth we see the tongue and teeth, next we have the neck which supports the head, then we have the trunk, tail and the limbs. Below and towards the hind limbs in the bull we see the testicles and the penis, and in the cow the mammae (udder) ; under the tail is seen the anus, and in the cow a little below it the vulva and vagina.

The whole body is covered with skin, and the skin with glossy hair. The head is composed of several bones known as the cranial bones, and within it we find a soft whitish mass with well marked irregular ridges on it known as the brain.

The brain is the organ of feeling. Every movement of the body is controlled by this organ and every touch or pain is felt by it. Continuous with the brain we have the same soft substance running along the bones of the back, known as the *spinal cord*. The brain as well as the spinal cord gives off prolongations of this white substance all throughout the body like so many threads, at their ends they branch and rebranch and gradually become thinner and thinner. These are as it were the messengers or the mediums through which all feelings are carried to the brain, and from which all motions are produced.

The horns are a prolongation of the bones specially fitted with a hard substance ; they serve as the organs of defence. Certain bones of the face are hollow and contain air, this makes the head lighter than what it would be.

The eyes are the organs through which the animal sees. They are constructed of several layers of transparent materials ending lastly in a nerve which carries impressions to the brain. The eye has eyelids and eyelashes, as a protecting medium. The outer transparent coat of the eye is known as the *cornea* and is fitted like a watch glass to the white portion of the eye, the *sclerotic*. Next to the cornea there is a watery substance (*aqueous humour*), then we come to a structure called the *iris* which is like a moveable screen, it has an aperture in the centre (*the pupil*). The iris contracts or expands according to the light present, and by its contraction the opening (pupil) expands and by its expansion the opening contracts. Behind this opening there is a somewhat hard disc like transparent body called the *lens*, and behind the lens the eye is filled with a thick transparent substance (the *vitreous humour*). Next comes the expansion of the nerve, the *retina*, which carries any image reflected on this transparent media to the brain, where the impression takes place. The eye secretes a watery substance, tears, which keep it always lubricated.

The ear. What we usually call the ear is only a part of the true ear, in fact that portion which is outside serves as a collector of sound; sound which is nothing more than a series of waves produced in the air, goes in through this opening and strikes a certain membrane within, called *the tympanum*, and through a nerve the impression is carried to the brain.

If we open the trunk, we find a hollow space from one end to the other; however this hollow space is divided into two partitions by a membrane the *diaphragm*. The front portion is the chest cavity and the posterior is the abdominal cavity. The chest as well as the abdominal cavity is lined with a thin soft membrane,

Within the chest is found a large light coloured porous mass, the *lungs*, divided into two portions. It has a tube, wind-pipe or *trachea* attached to it, which passes along the neck and ends at the back portion of the mouth, where there is a small box-like structure with several openings, seven in number, two of these leading to the nostrils.

Covered by the two portions of the lungs and placed towards the left side of the chest is seen a fleshy cone-shaped hollow organ known as the *heart*.

The *heart* contains four cavities, two upper, *auricles*, and two lower, *ventricles*. The walls of the lower compartments are thicker than those of the upper ones, and especially so is the wall of the left ventricle. From the left ventricle is seen a tube, the *aorta*, running about two inches and then dividing itself into two branches, one passing forward towards the head and the other in the direction of the tail; on their way they give off numerous branches, these branches divide and subdivide and spread all throughout the body until at last they are merely thread-like or in fact much smaller in size; these are known as *capillaries*. The capillaries again collect into large vessels, *veins*. All the veins from the posterior quarter collect into one trunk, the *vena cava*, and likewise those of the anterior to another *vena cava*, both these empty themselves into the right upper quarter (auricle) of the heart. The heart always contracts and expands and by its contraction it sends a current of a red liquor (blood) through the arteries; from thence it spreads to the capillaries, where it undergoes changes, in fact loses certain materials and takes in others, and returns through the veins to the right auricle. The upper and lower compartments of the heart communicate with one another through certain valves between

them, so the impure blood which comes to the right auricle goes to the right ventricle. From the right ventricle a tube goes to the lungs, *pulmonary artery*, and divides and redivides in it. When the heart contracts impure blood it is pumped to the lungs and after traversing through the minute branches of the pulmonary artery it returns through other tubes, the *pulmonary veins*, to the left auricle rid of its impurities, from thence it passes to the left ventricle through the valves between the two. Thus the blood takes a complete circuit through the body and returns purified from the lungs. The work of the heart is that of a pump.

Blood.—Blood is a liquid containing a sticky substance (fibrin) and two other varieties of bodies known respectively as white and red corpuscles. The blood supplies nutrition to all parts of the body.

Lungs.—The lungs purify the impure blood. The lungs as we mentioned before consist of a porous substance and are connected with the external air through the nostrils and the mouth. The tube which runs to the lungs from the mouth divides and re-divides in it forming bronchi, these end in certain thin sacs, *air cells*. The minute branches of the blood vessels too, are distributed in these. Animals take in air to the lungs through the air tubes and the blood takes up a certain gas from the air (oxygen) and is purified. In its turn the blood gives off impurities which leave with the breathed out air in the form of a gas known as carbonic acid. This breathing goes on continually and through it the blood is purified. If breathing be stopped the animal dies from want of pure blood.

It may be mentioned that the heart contracts forty to forty-five times in a minute in the ox; and the lungs take in and give out air from 14 to 16 times a minute.

Next we come to the abdominal cavity. Here we find a large sac divided into four portions known as the *stomach*, the long narrow *intestines* found arranged as it were in coils, and a scythe-shaped flat fleshy organ attached to the left side of the stomach known as the *spleen*. Another broad fleshy body in front of the stomach and between it and the diaphragm is called the *liver*. Towards the posterior region there is a narrow branched body, the *pancreas*. Two rounded lobulated bodies in the same region behind the pancreas are called the *kidneys*. The kidneys through two small tubes communicate with a large oval sack, the *bladder*. From the bladder issues a tube, the *urethra*, which passes through and ends in the penis. Just after the urethra leaves the bladder a tube joins it which communicates with the testicles in the male. In the cow the urethra ends in the vulva. In conjunction with the vulva, situated anteriorly to it towards the right side of the abdominal cavity, is the womb or the *uterus*. Connected with the *uterus* are found the *ovaries*.

The Stomach. The stomach of the ox has four divisions, known as the *rumen* or the paunch, the *reticulum*, the *omasum*, or maniplies, and the *abomasum*, or the true stomach. The rumen is very large and is nearly three-fourths of the whole stomach. The food chewed and swallowed is collected in this portion where it undergoes a certain form of maceration, the more liquid portions at the same time running to the reticulum, which is situated in front of the rumen. The reticulum is thus named on account of the honey-combed appearance of its inner surface. The third portion of the stomach, the *omasum*, is oval shaped and contains within it a large number of folds which are like the leaves of a book and, the food is triturated in it. The fourth or the true stomach is continuous with the third and its interior is covered with certain

groups of small sacs, glands and follicles. These glands secrete a fluid known as *gastric juice*.

Intestines.—Continuous with the stomach we find the long convoluted tube, the intestines, its first portion which is about half an inch in diameter is nearly one hundred and forty-four feet in length. The second portion much larger in calibre is over thirty-six feet in length and ends at the *anus*. The small intestine is divided into three portions, the *duodenum* about a foot in length, and which receives small tubes from the liver and the pancreas respectively, the *jejunum* and the *ileum*. The large intestine is divided into four parts viz., the *cæcum*, the *great colon*, the *small colon* and the *rectum*. In the inner surface of the intestines we find collections of small sacs or glands which secrete certain fluids and other sacs and depressions which have the power of absorbing or sucking in fluids.

The stomach on the other hand is connected with the mouth by a soft tube called the *gullet* or *esophagus*, which joins a fleshy box situated at the back of the mouth. This fleshy box, the *pharynx*, is common to the wind-pipe as well as the gullet, from one of its openings runs the wind-pipe and from another the gullet.

The liver is a solid structure situated between the stomach and the diaphragm, it performs many functions, among these it secretes a yellowish fluid known as *bile*. In the ox there is a sac or receptacle attached to the liver for its collection called the *gall-bladder*. The gall bladder is connected with the intestines by a thin tube, through which the bile pours into it little by little.

The pancreas or the *sweet bread*, is a small branched body placed behind the stomach, it secretes a liquid known as the *pancreatic fluid* which is poured into the intestines through a small tube or duct, just close to where the bile is poured from the liver.

The spleen or the scythe-shaped fleshy body attached to the left region of the stomach has no opening whatever. Its use is not clearly understood, but it is known to help greatly in the formation of blood.

Digestion is the act of preparation of the food in the animal system, so as to make it fit to be used in the building up of its structures. The various parts mentioned above, namely, the mouth, gullet, stomach, intestines, liver and pancreas assist in the digestion of food. The food introduced to the mouth is first ground by the teeth, chewed, it is then mixed with saliva. Saliva, it must be known, is a fluid secreted by certain bodies (glands) in the region of the mouth. Next the pulpy mass goes into the stomach, a large portion to the rumen and a little of the very liquid to the reticulum. From the rumen the food comes to the mouth a second time for rechewing, this act is called *rumination* or chewing the cud. The ruminated food goes down to the third, and from the third to the fourth part of the stomach, the abomasum, where a fluid secreted in it, the gastric juice, mixes with the food and further dissolves it. In the stomach it is partly absorbed and the rest passes to the intestines where it is at once mixed with bile from the liver, which not only helps to dissolve a great portion of the materials but prevents them from undue fermentation. The pancreatic juice also dissolves some of the remaining substances. The liquid gradually passes through the long intestines where it is mixed with the intestinal secretions and is absorbed or taken up by the *lacteals* and *villi*. Anything which is not thus taken up is thrown out of the system through the anus as *dung* or *faeces*. The lacteals convey the absorbed substance to small tubes which in turn join to form larger ones and then to a canal known as the *Thoracic duct*. In the same way the villi convey what they take in, to the *Portal vein*, which enters the liver. These enter

the *vena cava*, thus joining the general blood current and supplying the necessary nutriment for the purpose of building up the structures of the body.

The kidneys are two lobulated bodies situated posterior to the pancreas. The kidney is a sort of filter through which the blood in its passage leaves behind certain impurities. These impurities are passed off by the kidneys to the bladder where they collect in the form of urine. When the bladder is full the urine is discharged through the urethra which ends in the penis in the male and the vulva in the female.

The skin covers the whole body and is intimately connected with the functions of the animal. It regulates the body heat, and removes certain waste materials from it in the form of perspiration.

The Generative Organs are those structures which take part in reproduction. In the bull we have the testicles which secrete a fertilizing fluid, *semen*. The semen collects in two pouches in the urethra and is ejected in the act of copulation. The fertilizing principle in the semen is known as *spermatozoa*.

In the female the generative organs consist of the vulva and vagina the organs of copulation, the *ovaries* in which are found the vital germs the *ova*; and the uterus, or the sac in which the young animal is developed. The last occupies a period of nine months.

CHAP. VIII.

HEALTH AND DISEASE.

Any unusual behaviour, or appearance, of an animal is apt to be a sign of disease, and the "good shepherd or herdsman will at once detect that something is wrong and do his best to see what it is, and how it may best be dealt with. Cattle when in health graze in herds, feed freely, and chew the cud regularly, their eyes look bright and clear but not staring, their ears are in constant movement, noses damp with natural moisture, skin soft and clean, with the hair lying the proper way. They lick themselves frequently; their dung is passed regularly and somewhat soft, the urine flows away without much effort, and their limbs and feet are clean, fine, and used freely without sign of lameness.

When a beast is dull and looks heavy, separates from the herd, has a staring unthrifty coat, there is evidently something wrong. If the horns are hot, and the nose dry, and the mouth hot and dry, *fever* is present. It will generally be found that the urine is very yellow and small in quantity, and the dung hard and dry, the animal will not eat but will be very thirsty. It is most important to see whether fever is present because it is one of the symptoms of all the most deadly diseases, especially those which are communicable. When any part of the body is so diseased, that the animal becomes feverish, that part of the body is said to be *inflamed*, and all inflamed parts are apt to be red, hot, tender, swollen, and unable to do their work properly, these are considered the symptoms of inflammation.

The signs which an animal shows while it is not in health may be divided into two classes, general or

constitutional signs, which affect the whole system; and local signs or symptoms which show the special part or parts of the body affected.

The important general symptoms we usually observe in disease are the state of the pulse, breathing, temperature, and excretions.

Pulse.—The pulse is due to the enlargement of the arteries consequent on the contraction of the heart. In a healthy ox it amounts to 45 beats per minute. The pulse can be taken at some accessible artery which passes over some hard structure, we can successfully take the pulse of an ox:

1. At the artery which runs below the lower jaw, —*Submaxillary*.
2. At the artery within and to the front of the elbow joint,—*Brachial*.
3. Above and behind the fetlock joint,—*Metacarpal*.
4. At the artery at the middle of the root of the tail,—*Coccygeal*.
5. In the channel of the neck,—*Carotid*.
6. In front of the root of the ear,—*Auricular*.

If there be observed any great variation in the frequency of the pulse, or if it be changed in any way, it shows a symptom of disease. However it has to be borne in mind, that during the act of chewing the cud the number of the pulse increases rapidly, and this increase is also often observed in pregnancy.

Respiration or breathing.—Is the act of taking in and giving out of air to and from the lungs. The ox breathes nearly 15 times per minute during health, any increase or undue difference in the act of breathing is a

sign of disease. Just after exercise an animal may breathe hard and fast, but this quickly comes down to the normal when he has rested for a while.

Temperature or the amount of heat present in the body may ordinarily be felt by the touch of the hand. The mouth is the best place to feel for any increase of heat. However when a *Thermometer*, an instrument which measures the degree of heat, is available it should be used. The instrument must first be reduced, i. e., brought to its usual state, next it should be lubricated with some bland oil and introduced into the rectum, first taking care to remove any collection of dung in that part of the bowels. In the cow the instrument can with advantage be introduced into the vagina. It should be thus kept from three to five minutes, and taken out and read. The normal temperature of the ox is from 100° to 101° F.; an increase of two or three degrees is an unfailing symptom of disease, and in contagious diseases this increase of temperature is the first sign observed.

Excretions. are the refuse thrown out of the system such as faeces (dung) urine, sweat, &c.

Any alteration in the nature of these excretions or in their quantity is a sign of disease.

We may now proceed to see how a communicable disease may be distinguished from a simple one, by the ordinary cattle owner. He will find it difficult in the first case or two of an out-break, but should, whenever a death occurs he open the carcase it will enable him to decide whether the disease was a simple one or a contagious affection. If he can detect alterations in any of the parts of the body, especially those which will be described under the various contagious diseases, it must be taken as a serious matter, and he

ought to take every precaution. He must then at once do what is best to prevent the spread of the disorder. But, on the other hand, if the disease is simple, his mind can be at rest with regard to the safety of his other stock.

The symptoms are sometimes very puzzling, and do not always tell us exactly the nature of disease. The way in which the outbreak occurs will then guide us, thus, if a fair or market has been held lately near at hand, or stray cattle have been seen among the stock, or some newly bought animals have been put among the older ones, disease may be found to have been introduced in this way; but if with the commencement of the monsoon, and sudden abundance of grass after a short supply, many cattle die, or, if many suffer from diarrhoea with blood in the dung after the long dry hot season, these may be attributed to other causes than contagion.

CHAPTER IX.

NURSING.

When an animal is sick he requires better treatment ; in fact, a complete change of the usual care bestowed on him. No medicine can cure an animal unless it is properly nursed, medicines being only agents employed to combat particular developments of a disease. The care and comfort of a sick animal should be attended to as regards his food, drink, shelter and general treatment.

Food.—It should be light, easily digestible, well prepared, and not forced on the patient, but placed where he can take it when he wants. Hay tea, rice or rhaggy congee, and a little green stuff such as lucerne are the best for a sick animal.

Drink.—Thin gruel, or water with a little nitre in it, should be left near at hand, within easy reach of the sick animal. In all cases the water should be of the purest kind, and it is always better to take away the chill, or warm the water before it is given.

Shelter.—A shed, tope, stable, or some other shelter, should be given to a sick animal, and in some cases he may require to be covered with a blanket.

Cleanliness is of great importance. Not only must the shed be warm, but it must have fresh air and be kept clean ; unless this is attended to, the disease will be much more severe than it otherwise would have been. Also the dressings of wounds, &c., should be attended to : when there is a smell, it can be got rid of by sprinkling disinfectants about the shed.

Much harm is done to a sick animal by trying to force upon him food and drink when he is not inclined to eat. We must by all means supply him with suitable

food, but if he has no inclination to take it, it should not be forced on him, as food so given causes not only nausea and indigestion, but brings on a dislike for all foods. When an animal lies down through prostration, care should be taken to place a thick layer of straw, dry grass, saw-dust, or even fine sand, under him, so that he may lie in comfort; besides, it is of great importance to change his position several times a day, so as to prevent the formation of bed sores, which are produced by the constant rubbing of the skin and the general weak condition of the animal.

All sick animals should be kept as quiet as possible, no rough word or ill-treatment should be allowed. It must be impressed upon the minds of the attendants, that a poor sick animal is a helpless, irresponsible creature and should never be punished. When an animal is very weak and unable to take any diet, some nutritious food, such as thin gruel with milk, should be thrown into the intestines through the rectum. It also, often becomes necessary to introduce medicines in the above way. It is known as an *enema* or *clyster*. For giving an enema, a funnel with a long tube bent at right angles is used. The hand is oiled and carefully introduced into the rectum and any dung found there is first removed. Next the nozzle of the funnel, also oiled, is cautiously introduced. The food or medicine is poured into the funnel from which it will pass into the intestines through the tube. After introducing the food, the funnel is carefully withdrawn and the tail held down for a few minutes to prevent the animal from throwing out the liquid. A clyster or enema pipe for ordinary use may be made with a piece of hollow bamboo, a foot long with a diameter of about half an inch, after rounding off the edges, a small leathern bag or a bladder is taken and the bamboo inserted to it through a hole made at the bottom of the bag, and securely

fastened. When an enema is to be given, the bamboo tube, well oiled, is introduced into the rectum and the fluid to be given is poured in the leathern bag or bladder, holding it stretched up above the level of the back.

In connection with food for sick animals it was mentioned that hay tea, rice congee, gruel, &c., should be given. Hay tea can be prepared by cutting up some sweet hay which should be placed in a bucket or vessel and pouring boiling water over it ; after allowing it to stand from five to ten minutes, the water, now hay tea, should be strained off for use. A little salt ought to be added to this tea to give it a flavour.

Congee is made with rice, millets, flour or starch. When rice or millets are used the grain should be washed and cleaned and boiled with a quantity of water for about an hour ; when the grains are boiled and soft, they should be broken up in the vessel by constant stirring with a ladle. A little salt should be added to the congee. When starch is used it should be first dissolved in cold water and then warm water added to the solution, at the same time stirring it up with a ladle. Salt should always be added, and when necessary some aromatic, such as ginger, coriander or cinnamon, may be added to it with advantage.

Gruel from linseed is best made by boiling the seed with a large quantity of water,—say eight quarts of water to a pound of seed—for about an hour, keeping it stirred up all the time. After it is boiled as above, the liquor is strained through a thin piece of cloth and salt added to it. Rice and millet gruel could also be made as above.

Fomentations and poultices also deserve some notice here. A part may be fomented with hot water, with a

piece of thick woollen or flannel cloth, the fomentation should be continued for over a quarter of an hour and afterwards the part thoroughly dried.

Poultices are made of bran, rice, kultie, linseed meal, &c.; hot water is poured over the substance so as to make a soft mass; this is placed on a cloth and applied over the required part. A little charcoal powder or a sprinkling of carbolic acid keeps a poultice sweet. A poultice should not be allowed to stand too long as it is apt to get sour: it should be changed at least twice or thrice a day.

When cows in milk are sick care should always be taken to strip the udders daily, as any accumulation of milk in the udders is liable to set up inflammation of the part.

When an animal is convalescent, he should gradually be returned to his ordinary diet and work.

CHAPTER X.

PREVENTION OF DISEASE.

It is much better to prevent disease by adopting measures to keep animals in health, than to rely upon curing them if they fall sick. We have already seen that the principal causes of the most frequent and fatal diseases in cattle, could be attributed to bad food, impure air, foul water, excessive work, and bad management in general, also exposure to contagion.

Prevention of simple diseases depends on experience of the best methods of managing animals. Whenever it is necessary to make any change in feeding, housing or otherwise, it should be done gradually, for sudden changes are a most frequent cause of disease. Again, it must be remembered that, it is generally cheaper and better to supply animals with good food and shelter than to neglect them. Regularity in feeding, and careful attention to the state of the weather, with a view to regulating work, diet, and shelter, is very important. Whenever an animal seems out of sorts or behaves in any unusual manner, he should be carefully examined and nursed, as it is advisable to take disease in hand in its earliest stage before it has had an opportunity of doing serious mischief, and obtaining a hold on the system. A case should never be neglected because it seems simple; some of the most deadly disorders, such as pleuro-pneumonia, commences with trivial symptoms, and the animal does not seem seriously ill, until the disease has run its course to such an extent as to make it incurable.

General good management of animals secures them eminently from many diseases; but a cattle owner must take the greatest care to keep away contagious

diseases from his animals. With this view the following rules may be observed with advantage :—

- (1) Stray animals should be prevented from coming in contact with cattle.
- (2) All animals which have been recently bought, or have lately travelled along roads on a journey, or are known to have been in contact with strange ones, whether on a journey or in a fair or market, should be kept apart from others.
- (3) Whenever an animal shows signs of sickness of any kind, he should be separated from healthy ones, and kept apart; his food and drinking water being brought to him.
- (4) When contagious disease is suspected, the animal should be kept strictly apart from the rest at a distance of at least 500 yards. All his bedding, gear, dung, and other materials which have been in contact with him should be destroyed by burning. One or more men should be placed in charge of the diseased animals to nurse them carefully, and prevent them coming in contact with other cattle in any way. Dogs, crows, &c. must be kept out of the Hospital Pound as much as possible.
- (5) The stall or shed in which a diseased animal has been should be disinfected by burning sulphur about the place, or by sprinkling some disinfectant, such as a solution of carbolic Acid, soluble phenyl, or chloride of zinc, on the walls and floor. The floor should be dug up and fresh earth placed and all walls and wood work white washed.
- (6) All animals which have been in contact with diseased animals should be thoroughly washed with a disinfectant solution and should be kept apart from the healthy.
- (7) Animals which have to travel, should not be allowed to mix with others. They should be driven not too far, nor too hard, nor in the heat of the day, and they should be well fed, and carefully watered on the road.
- (8) Animals that recover, should be well washed, and pastured for at least a month, apart from the herd.

(9) Those attending on the sick animals should not be allowed to approach the healthy.

(10) All things used in the treatment of sick animals, and litter, dung, dressings, and carcases of dead animals, should be burnt. I had introduced a cinerator for this purpose which was adopted by Government in various places and which does very useful work.

The subject of *cinerators* and cremation being of great importance in connection with the prevention of disease, I give below a detailed account of the general principles, construction and use of cinerators.

CINERATORS.

In a country like India, where there are very many domesticated animals, the proper disposal of the dead is a question of paramount importance, although one evidently much neglected. By burial, however deep, the soil of certain parts of the country, in time, must become more or less contaminated, and the atmosphere rendered impure, unhealthy, and dangerous to man and beast. Burying is, without a doubt, the most insanitary mode of getting rid of the dead, and one which ought to be put a stop to, where practicable, by Government, even by the institution, if necessary, of stringent laws on the subject, although perhaps these might infringe on the private rights of the population; that consideration must be set aside, when, through improper sanitation, the lives of human beings are in danger.

I would strongly recommend the building throughout India of cinerators described below, not only for the purpose of cremating or reducing to ashes the carcases of animals that have died from such diseases as anthrax, or have been destroyed for glanders, but also for getting rid of all refuse or objectionable matter,

such as dressings from wounds and sores, and the stable litter, where it cannot be utilised as manure, and where its accumulation becomes objectionable.

There is no better or more effectual mode of getting rid of disease germs than by fire ; and, in fact, it is evident that this is the only true way of preventing the spread of contagion ; as the havoc wrought by contagious diseases constitutes a most serious loss to the country. The disease germs of anthrax (one of the most fatal animal scourges known in India, and one, the increasing prevalence of which no doubt is due to burial instead of cremation of the dead), can travel, as has been proved, considerable distances through the medium of earth-worms and retain their vitality for a very long period. These should decidedly be destroyed, if we want to remove the cause of the disease. In fact, in nine out of ten outbreaks of contagious disease in men and animals, the cause can be traced to the absence of proper measures for the disposal of infected matter, and, in the interest of the public, cineration should get a thorough trial and cinerators ought to be erected near all hospitals, cholera camps, sick lines for animals, hospital pounds, and bazaars, for the purpose of burning everything likely to, or capable of, conveying disease.

As regards the question of fuel for cinerators for hospital use, in all stations where there are horses, it would be an easy matter to get a load of stable litter, which I find answers the purpose well. The building of a cinerator of mud or clay would cost only five or six rupees, and a large one for cremating animals would cost sixteen or eighteen rupees ; therefore, on the score of expense, there can be little objection to them.

Clay is much to be preferred in constructing a cinerator, as it forms a firmer and more permanent wall and

one less likely to be affected by the rains, than mud ; therefore, in places where clay is procurable, I would strongly recommend its use. If they are to be constructed of brick, there will be necessarily a much greater expense ; however, from several years' experience of the mud ones, I find they serve every requirement. They can be easily and readily put up without the aid of skilled labour and at a trifling cost, which is no small item in their favour. They are now in constant use in many parts of India and have been adopted, on my suggestion, and extensively utilized with advantage.

To show what can be done with these cinerators, I may here state that I was able, during an outbreak of glanders and farcy at St. Thomas' Mount, Madras, to cremate the carcases of eleven of the horses destroyed on account of the disease. At Secunderabad, I disposed of the carcase of a horse that died from anthrax in the same manner. The average time occupied in reducing them to ashes was about twelve hours per horse, with no other fuel than stable litter. I think this is sufficient proof of their practicability, and I cannot help remarking that I look upon the above evidence as most satisfactory, because I have been able thus to effectually dispose of the carcases of these animals, incurring but little expense to the Government, and saving the district from probable contamination by burial, and, at the same time, I have to an extent illustrated how far many of the sanitary evils which now exist are subject to human control. Of course, cremation may be effected much more speedily by the aid of wood, but I do not see that this is at all necessary, as the stable litter consumes the carcase with sufficient rapidity for all practical purposes.

The site to build cinerators on, should be selected where as much draught as possible is procurable, and where the smoke will not become a nuisance, or in any

way interfere with the public health. Where clay is not procurable and the wall is made of mud or brick, it must be made much thicker, especially at its base; in fact, to stand any time, it ought to be made nearly double that of a clay wall. After the foundation is constructed, it should be allowed to set for some days before beginning the superstructure; then the first three feet of the wall should also be allowed to thoroughly harden before placing the stones, which are to form the top or arch of the vent holes. The rest of the structure should then be put up, but not in too great a hurry. A few loads of stone or large boulders would form a good foundation for the steps. When the cinerator is finished and thoroughly dry, it ought to be well lapped over, and this operation repeated weekly, till all the cracks in the wall are filled up.

Rules for use.—1. In filling the cinerator for the first time, as much straw as can be spared should be placed in the bottom, so as to give the fire a start, then gradually filled up, and when half full, the straw ignited at the vent holes. After the walls are thoroughly heated, any material will burn.

2. Care must be taken to keep the vent holes well cleared of ashes, to prevent "choking." This can be done with a rake or fork made and secured to the end of a long bamboo.

3. The cinerator should be entirely cleared out every fortnight or three weeks, so as to make any repairs to the walls which may be necessary.

4. For cremating a carcase, the cinerator should be filled about three parts full with litter and the body put in, either whole or in pieces, and covered over with fuel. More fuel should be gradually added to ensure its thorough cineration.

5. During the rains, the walls of the cinerator should be covered by a large tattie, or a screen of green boughs, with their leaves placed against the side on which the rain is beating, and a trench dug around the furnace to prevent inundation.

The ashes or charcoal from a cinerator, I have found most useful to throw into stables, as it acts as a deodorizer and absorbs the urine from the stable floors; all that is required are a few heaps of the ashes distributed throughout the stable, so as to be readily got at by the syces. I need scarcely add that such uses of the ashes, as I here recommend, are attended with no danger to man or animal. No germs can withstand the process of combustion. They, like the animal they have destroyed, are reduced to charcoal.

It must be remembered that these cinerators, like everything else, if we want them to succeed, must be personally superintended, both in the building and in the working of them, as if the necessary details be left to others, carelessness will probably bring them into discredit and eventual disuse; but after several years' experience of them, and having spent a good deal of time and trouble in bringing them to their present state, I can confidently assert, that if properly built and worked as laid down here, they will be found valuable agents in a sanitary point of view.

I have seen bodies of human beings cremated by means of bratties, (dung cakes): the process is evidently most effectual, simple in the extreme, and inexpensive. This could with advantage be made applicable to the disposal of the carcases of the lower animals, more especially when it is impracticable or hardly necessary to build a cinerator, or when a sudden outbreak of disease gives no time to erect one. The way I saw it used was, in the form of a pile of bratties

about $1\frac{1}{2}$ feet high, over which the corpse was placed, and more bratties heaped on, making a regular mound; the whole was lit from below, and in a very short time little was left but ashes.

With the carcase of an animal, of course, the difficulty would be in getting it on the pile, but I think if it were simply laid on the ground and well covered with bratties and the pile lighted, cremation would rapidly take place. It must be remembered that once thoroughly alight the body will burn by itself, for bones and fat make excellent fuel. Possibly there would be a saving in fuel, if a hole were dug, say 6 x 4 x 2 ft. and filled with dung cakes, the carcase being placed over them and well covered.

Near almost every Cantonment, forming a very insanitary belt around the habitations, are refuse pits, where bones and rubbish of various kinds exist. The surrounding air is foul in the extreme, in the hot weather, and almost unbearable in the rains. Surely, cinerators would be of great use in such places and the bones and refuse would make good fuel.

CHAPTER XI.

MEDICINE AND MEDICINAL AGENTS.

Medicines act variously on the animal body, but for general purposes the action of different medicines may be classified under four principal heads, viz:—*Eliminatives, Haemetics, Neurotics, and Astringents.*

ELIMINATIVES are those agents which increase the secretions of the different organs of the body, thereby tending to remove waste products or any deleterious materials. They are variously named according to the particular organ or sets of organs on which they act, thus:—

(a.) *Cathartics* or *Purgatives* act on the alimentary canal, increasing the discharge of faeces. Some of the common cathartics, useful in treating cattle, are:—Epsom salts, Croton oil, Linseed oil, Gingelly oil, Common salt, Calomel, Tamarind, &c.

(b.) *Diuretics* act on the kidneys and increase the secretion of urine, e.g.: Turpentine, Resin, Nitre, Sweet spirits of nitre, &c.

(c.) *Diaphoretics* act on the skin and increase the quantity of sweat. Examples:—Nitre, Ammonia, Ether, &c.

(d.) *Sialagogues* increase the flow of saliva; examples:—Acids, Ginger, Mustard, Pepper, Iodine, &c.

(e.) *Expectorants* increase the secretions of the tubes of the lungs; examples:—Ammonia, Camphor, Steam, Chlorine, &c.

HAEMETICS are medicines which act on the blood. Of these we have restoratives, tonics, alteratives and disinfectants.

(a.) *Restoratives* are those which restore some constituent to the blood, as Iron, Lime, Salt, &c.

(b.) *Tonics* are those which nourish the muscles and give tone to the whole body, as Gentian, Chiretta, Cinchona, *Nux Vomica*, also Coriander, Aniseed, Fenugreek, Ginger, Cardamoms, &c.

(c.) *Alteratives* are those which improve the condition of the system by altering diseased into healthy tissues, as Calomel, Iodine, Arsenic, Sulphur, &c.

(d.) *Disinfectants* are those which act on and destroy disease producing germs, as Carbolic Acid, Corrosive sublimate, Zinc chloride, Neem oil, &c.

NEUROTICS are agents which act on the nerves. They are classed as under,

(a.) *Stimulants* which stimulate the nerves and bring the various parts into increased action, as Alcohol, Ether, Camphor, Turpentine, Ammonia, &c.

(b.) *Sedatives* which depress the nerves and allay excitement as Aconite, Dhatura, Tobacco, Chloral hydrate.

(c.) *Narcotics* which first stimulate and then depress the system, as Opium, Tobacco, Alcohol, &c.

ASTRINGENTS are agents which reduce the various secretions, as,

Alum, Catochu, Chalk, and Gallnuts.

We have also, in addition to the above, certain classes of agents which act externally; of these the most important are Counter-irritants and Refrigerents.

Counter-irritants when applied to the skin produce artificial irritation and by this means counteract diseased action in various parts of the body, as,

Hot water, Mustard, Iodine, Caonthrides, Iodide of mercury.

Refrigerents, are cold applications which contract tissues and give tone to them, as cold water, ice, solutions of Ammonium chloride, Salt, Lead acetate, Nitre, &c.

We shall now give a short account of the common medicinal agents with their respective doses, and particulars regarding their uses.

VEGETABLE DRUGS.

ACONITE, *Aconitum Napellus*, Sanskrit Atibisha; *Bengali*, Katbishi; *Hindi*, Mithatitia; *Dekkani*, Uchauak; *Tamil*, Vashnavi; *Singhalese*, Wachchanavi.

It is used in the form of a tincture made from the roots. In excessive doses it is a poison; but in medicinal doses is a good soothing agent, especially given in acute fevers, and inflammations.

Dose : *Tincture*, half a dram. *Powdered root*, 10 grains.

CAMPHOR is a volatile oleo resin obtained from the wood of *Camphora officinarum*. Vern. : Kafur, Kapur.

Is a stimulant and a soothing agent, useful in cough and diarrhoea, externally is useful in scurfy neck, and skin diseases. *Dose* : *Two to four drams*.

CASTOR OIL—Oil extracted from the seed of *Ricinus communis*. *Bengali*, Reri; *Hindi*, Andi; *Dekkani*, Yaraudi; *Tamil*, Amanakkam kotti; *Singhalese*, Erandu.

It is a safe purgative especially useful in young animals; also in pregnancy in cows, and in diarrhoea, dysentery and diseases of the kidneys. *Dose*, *one pint*.

CATECHU is an astringent obtained by infusing and evaporating the wood of *acacia catechu*, from *uncaria gambir* or arecanuts, *areca catechu*. *Hindi*, *Bengali* and *Dekkani*, kat; *Tamil*, katta kambu; *Singhalese*, kaippu.

It is given to arrest excessive mucous discharge from the alimentary canal, removes flatulence and arrests irritability, it is also used externally in the treatment of ulcers. *Dose*, *Two to six drams*.

CHARCOAL is carbon from burnt wood or from burnt bones. *Bengali* and *Hindi*, Koyla; *Dekkani*, Kolsa; *Tamil*, Kare; *Singhalese*, Anguru.

It is a disinfectant and a powerful absorbent. It checks fermentation and hence is used in hoven and impaction; also used in ulcers to arrest putrefaction and to remove bad odours. It is a valuable antidote in poisoning.

CHIRETTA is the dried plant, *Ophelia chiraytu*, *Sanskrit*, Chiraitaka; *Bengali* and *Hindi*, Chireta; *Tamil*, Shaysait; *Singhalese*, Binkohomba.

It is a very valuable bitter tonic useful in debility, diarrhoea, dysentery, &c., also in fevers. *Dose* : *One to two ounces*.

CINCHONA is the bark of the *cinchona* tree.

It is a bitter stomachic, antiseptic and tonic; checks fermentation and excessive mucous discharge from the alimentary canal; used in fevers, malaria, diarrhoea, and debility. *Dose* : *One to two ounces*.

CINNAMON is the bark of the *Cinnamomum Zeylanicum*. *Bengali*, Dalchini; *Hindi*, Darchini; *Tamil*, Karna puttai; *Singhalese*, Kurundu.

Is a tonic, astringent, and aromatic; useful in combination with other drugs, especially in colic, diarrhoea and dysentery. *Dose*: One to two ounces.

CORIANDER is the seed of the *Coriandrum Sativum*. *Sanskrit*, Dhanyaka; *Bengali* and *Hindi*, Dhanya; *Tamil* and *Singhalese*, Kottamalli.

A useful aromatic, carminative and tonic; relieves indigestion and griping, also used in flavouring food and other medicines. *Dose*: One to two ounces.

CROTON oil, obtained from the seeds of the *Croton Tiglium*; Vern. :—Jepal.

It is a strong purgative, useful in indigestion and impaction of the stomach, also in nervous diseases, where there is difficulty in swallowing, such as in parturient apoplexy; externally is a useful counter irritant. *Dose*: Thirty to thirty-six seeds, or half to one drachm of oil.

DHATURA, the leaves and seed of the *Datura Stramonium*. *Bengali*, *Hindi*, and *Dekkani*, Dhatura; *Tamil*, Ummattas; *Singhalese*, Attana.

Is a useful sedative in febrile diseases. *Dose*: Leaves, half to one ounce; seed, one to two drachms.

GALLNUTS are the growths on the leaves of the oak, they are produced by the gall worm, but in India the name is applied to the various kinds of myrobalams, as *Terminalia Chebula*, *T. Belerica*, and *T. Embelica*. *Bengali*, Haritaki; *Hindi*, Herra; *Dekkani*, Halda; *Tamil*, Kadukkai; *Singhalese*, Aralu.

Is an astringent tonic, useful in diarrhoea, and externally in the treatment of wounds and ulcers. *Dose*: One to two ounces.

GENTIAN, roots of the *Gentiana lutea* of Europe and *Gentiana Kurroo* of India. *Bengali* and *Hindi* Karroo katki.

Is a bitter stomachic and tonic, given in debility, fever and indigestion. *Dose* : One to two ounces.

GINGELLY OIL, obtained from the seeds of *Sesamum Indicum*. *Bengali* and *Hindi*, Til ; *Tamil*, Ellu ; *Singhalese*, Tala.

Is a laxative; and externally a soothing application for wounds. *Dose* : One to one and a half pints.

GINGER, the underground stem of *Zingiber officinale*. *Bengali*, Ada sunt ; *Hindi*, Adrak sont ; *Tamil* Shukku ; *Singhalese*, Inguru.

Is a stomachic and mild tonic; useful in colicky pains, indigestion, hoven, &c., and is one of the most valuable medicines.—*Dose*, One to four ounces.

JAGGERY, obtained by boiling the sweet sap from palm flowers; also from the juice of the sugarcane.

A valuable agent to tempt the appetite of animals, also to mix with certain remedies to make them palatable.

LINSEED OIL, obtained from the seeds of *Linum usitatissimum*. *Bengali* Tisi, Masina ; *Hindi*, Alsi ; *Tamil*, Alsiverai.

Is a useful purgative, especially for young animals. It allays irritation, and is useful in indigestion, diarrhoea and dysentery. It is also a valuable nutrient. *Dose* : One to one and a half pints.

MUSTARD, seeds of *Sinapis* ; Vern. : Sarson ; *Singhalese*, Aba.

Is a stomachic, carminative and stimulant, useful in indigestion and colic. Rubbed externally it acts as a counter-irritant.

NEEM or MARGOSA, is the *Melia Azadirachta*. *Sanskrit*, Nimba ; *Bengali*, Nim ; *Tamil*, Veppu ; *Singhalese*, Kohomba.

The leaves either in the form of a poultice, or as a decoction, when applied to swellings and sores, remove pain. The bark is a

tonic, and may be given in cases where there is great weakness. The oil when applied to sores, heals them by protecting them from the air, flies, &c.—*Dose of the bark, one to three ounces.*

NUX VOMICA, is the seed of the *Strychnos Nux vomica*. *Bengali* and *Hindi*, Kuchila; *Tamil*, Yetti; *Singhalese*, Godakadury.

A stimulant and tonic, useful in diarrhoea, constipation and brain diseases. *Dose: One to two drams.*

OPIUM is the gummy exudate obtained from the capsules of *Papaver Somniferum*, Vern: Afim.

Is a stimulant, restorative and soothing agent of great value, used in inflammations and painful diseases, also in diarrhoea, dysentery and inflammations of the alimentary canal. *Dose: Two to four drams.*

QUININE is the alkaloid obtained from the Cinchona bark, has the same tonic, antiseptic, antiperiodic properties as cinchona but to a greater degree. *Dose: One dram.*

TAMARIND, the pulp of the fruit of the *Tamarindus Indicus*; *Sanskrit*, Tintri; *Bengali*, Tetul; *Hindi*, Imli; *Tamil*, Puli; *Singhalese*, Siyambala.

Is a very useful laxative for young and weak animals. The leaves are useful in fomentations. *Dose: One to three ounces.*

TURPENTINE is an oleo resin obtained from trees of the pine family, *Bengali*, Kapurertel; *Hindi* and *Dekkani*, Gandha-barojekatel; *Tamil*, Karpuratilam.

Is a stimulant diuretic and a vermisuge, useful in indigestion, colic, debility, &c. Externally turpentine is a stimulant and antiseptic. *Dose: One to two ounces.*

MINERAL DRUGS.

ALUM, *Aluminium potassium sulphate*; *Bengali* and *Hindi*, Phitkari; *Tamil* Patikar; *Singhalese*, Sinakkaram.

An astringent, useful in internal bleeding, may be given in diarrhoea. Applied as a lotion in foot and mouth disease, in ulcers, sores, and wounds. *Dose: Two to four drachms.*

AMMONIA SOLUTION.

A diffusible stimulant useful in diseases of the blood as well as in debilitating diseases, externally it is a stimulant. *Dose: Half to one ounce.*

ARSENIC (WHITE) *Arsenious acid.* Vern. : Sankya.

Is a useful alterative and tonic, though in large doses it is a poison. Medicinally is useful in rheumatism and nervous diseases also in skin diseases. Arsenic should be carefully used and in no case should its administration be continued for more than one week at a time, as it is liable to collect in the system and eventually poison an animal. *Dose: Five to ten grains.*

CALOMEL, *Mercury sub-chloride.*

In large doses is a poison and even in ordinary doses it should not be continually used as it is apt to accumulate. Medicinally it is a purgative and alterative, useful in intestinal diseases and enlargements of the glands. *Dose: Ten to thirty grains.*

CARBOLIC ACID.

Internally, it is useful in such specific diseases as anthrax, rinder pest and pleuropneumonia, acts as a powerful disinfectant and destroy disease germs. Externally a twenty per cent solution of the acid is a valuable agent in dressing all wounds and ulcers, and in disinfecting. *Dose: Half to one drachm.*

CHALK, *Calcium Carbonate.*

Is an astringent, checks discharges from the alimentary canal, also dries up wounds. *Dose: From two to four drachms.*

CORROSIVE SUBLIMATE, *Mercury perchloride,* Vern.: Shaviram, Darchikna.

A heavy salt, very poisonous, but a most useful antiseptic in solutions containing 1 to 1000 of water. It destroys germs, and is useful in treating wounds, ulcers and skin disease.

COPPER SULPHATE (*Blue Stone*) Bengali, Nilatutiya ; Hindi, Nilatutta ; Dekkani, Mortutta ; Tamil, Myltutam ; Singhalese, Palmanikkam.

Blue stone is a tonic, astringent, and caustic. Useful in diarrhoea, dysentery, and lung diseases. It acts in the same manner as Sulphate of Iron. Externally is a powerful caustic and useful in treating long standing ulcers. *Dose: One to three drachms.*

EPSOM SALTS, *Magnesium sulphate*.

Is the best and most common purgative for cattle. *Dose* : One to two pounds.

**IRON SULPHATE, *Bengali, Hindi* and *Dekkani*,
Hirakasis ; *Tamil* and *Singhalese*, *Annavadi*.**

Sulphate of Iron is one of the best tonics ; is useful in cases of fever, weakness, dropsy, &c. *Dose* : Two to three drachms.

LEAD ACETATE, *Sugar of lead*.

Internally, in large doses acts as a poison, but externally is a very valuable medicine for application in the form of a solution, a drachm to a pint of water, in all inflammations. It allays pain, cools and soothes the parts.

LIME, *Calcium oxide*, Vern. :—*Chuna*.

Lime water, prepared by dissolving lime in water and filtering through a blotting paper, is very useful in indigestion in young animals. Externally, mixed with equal parts of oil, it is the best application for burns. *Dose* : One to two ounces.

**NITRE, *Potassium nitrate*, *Bengali, Hindi* and *Dekkani*
Sornkar ; *Tamil*, *Petiluppu* ; *Singhalese*, *Wedilunu*.**

May be safely given in all cases of fever, it is pleasant to the taste ; it may be given dissolved with water or congee. It increases the amount of urine and sweat, also proves useful in reducing dropsical swellings. *Dose* : Half to one ounce.

**SALT, *Sodium chloride*. Vern. : *Nimak* ; *Tamil*,
Uppu ; *Singhalese*, *Lunu*.**

It is a most valuable purifier of the blood, and is useful for animals in health as well as in disease. It keeps the dung and urine natural, and removes parasites. It is particularly valuable as a preventative of rot in sheep. *Dose* : Half to one ounce.

SAL AMMONIAC, *Ammonium Chloride*, Vern. : *Nou-sagar*.

Is one of the best medicines for liver disease, and is generally given combined with chiretta and nitre. *Dose* : One to two ounces,

SULPHUR, Vern. : Gandak.

Is given with benefit in fever, also applied in skin diseases, made into an ointment with lard. *Dose : One to three ounces.*

ANIMAL PRODUCTS.

CANTHARIDES, (Indian) is the insect (*mylabris cichorii*) Vern. : Telepoka.

Is a useful counter irritant used in inflammations, bone diseases, &c., mixed with eight times its own quantity of lard or fat.

FAT, Vern : Cherbi.

Is a soothing agent and is specially valuable in combining with other materials for external applications.

The following weights and measures are used in dispensing medicine.

60	grains	=	1	drachm
8	drachms	=	1	ounce
16	ounces	=	1	pound

60	minims	=	1	fluid drachm
8	fluid drachms	=	1	fluid ounce
20	fluid ounces	=	1	pint

a drachm weighs	„	3	two auna bits
an ounce	„	3	rupees

CHAPTER XII.

CONTAGIOUS DISEASES.

We have already, in the previous pages, dwelt generally on the nature of contagious diseases and the best methods of preventing their occurrence and spread. Now we shall take these diseases, one by one, in their order of importance.

Anthrax, "BLACK DISEASE" is the most serious of all contagious diseases, as it can be communicated to any animal, and even to man ; it is highly fatal in cattle, sheep, and horses in India, and appears under the most varied forms, of which the following are the principal :—

Splenic Apoplexy.—In this form the animal suddenly becomes ill and quite prostrate, his nose and eyelids assume a dark-red, or almost black colour, he passes much dark blood from the bowels mixed with dung, and dies in a very short time. When the carcase is opened the blood is found to be black-red in colour, the spleen enormous in size, and full of dark, tarry blood. The body decomposes very rapidly.

Quarter ill commences with lameness, generally of one hind limb, which rapidly becomes swollen, gases collect under the skin, and crackles when pressed upon. This form is most frequent in calves, when they are first turned out on a rich pasture. Death rapidly ensues.

Malignant Sore Throat is denoted by the animal being very unwell and weak, there are the symptoms of inflammation of the tongue and throat, the mouth is black and the breath most offensive. Death comes quickly and treatment is powerless to avert it. In all forms of anthrax the disease sets in with a shivering fit, followed by fever, the fever runs high in a very

short time, the mucous membranes of the body, such as those of the eyes, nostrils, mouth, &c., become injected. The disease appears from six to seventy hours after a healthy animal has taken the poison into his system.

Carbuncles and Anthrax Fever are seen in men as a result of inoculation with blood or other matter from diseased animals; even dry hides may convey this terrible and fatal disorder, and many people who sort wool die from that wool having been taken from sheep which have died from this disease. The traffic in hides and in wool is a means of greatly spreading contagious diseases.

It is important to understand the real cause of this disease. We now know that it is caused by very small parasites or organisms in the blood, which grow and increase rapidly there. When an animal dies from anthrax, and his blood is shed over grass, or his carcase allowed to be torn in pieces by wild beasts and birds, these parasites fall on to the soil and develop there; and may even after a year's time give disease to animals pasturing on the grass, which grows on such spots. Thus the carcases of animals affected with communicable diseases should be got rid of by burning. Jackals, kites, and other scavengers spread anthrax, even such apparently simple creatures as ants, flies, and earth-worms are large enough to carry very many anthrax parasites, and spread the disease broadcast. Strange to say, flesh-eating animals scarcely ever suffer from it. On opening the carcase of an animal which has died of this disease, the blood is found to be black and liquid like tar, those parts which are particularly diseased are very black and swollen, and decompose readily, and there are blood spots and patches in almost every part of the body. The directions given in the general treatment of all contagious diseases should be followed when anthrax appears. In addition it is believed by some,

that passing a seton in the dewlap of healthy animals, and giving them an ample supply of salt, to an extent prevents them getting the disease. The sick animals, if they are early found out, might be given a laxative and small doses of carbolic acid. But generally treatment is of no avail.

Rinderpest or Cattle Plague is a frequent and fatal disease in many parts of the country. A week to a fortnight after an animal has been exposed to infection, he falls sick and the disorder rapidly spreads in a herd. It is difficult in the earliest stages to decide as to the exact nature of the disease, but later very marked symptoms set in ; of these, extreme weakness amounting to prostration, twitching of the muscles of the body, first constipation followed by severe diarrhoea, with a very foul and peculiar smell of the matter passed, which is often mixed with blood, eruptions of the membrane of the nose, mouth, and certain parts of the skin, such as those covering the vulva and the udder. A peculiar cough is generally present, in addition to general high fever and a flow of acrid tears from the eyes. The disease runs its course in from seven to ten days, and usually ends fatally. After death, the intestines and stomach are especially found diseased, and large patches of blood, which has escaped from the veins, are found in different parts of the body. Cattle suffer from this disorder, and sheep can take it from them ; it is highly communicable. It must not be confounded with simple dysentery, in which there is no eruption in the mouth.

Treatment.—The healthy animals should be at once segregated from the sick. The diseased animals should be given an ample supply of drinking-water with salt and nitre in it. When the bowels are constipated they should be given a laxative dose of Epsom salts. When dysentery sets in, bitter tonics, such as chiretta, cinchona bark, also

decoction of bael fruit may be given along with arrack. Their strength should be supported by giving congee, milk, &c.

Foot and Mouth disease is a highly infectious and contagious disease, communicable to animals of all kinds ; even elephants and men suffer from it, and it proves very fatal in common poultry. As its name shows, it is an eruption in the mouth and on the feet, but in some cases the mouth, and in others the feet only are affected. But if a number of animals are attacked, some are sure to show the disease of both feet and mouth. The eruptions in the mouth are white bladders, which burst and expose red patches of the skin ; they are found on the tongue, roof of mouth, gums, &c. The feet become swollen, the animal goes lame, and ulcers soon appear, particularly in the cleft between the toes and on the coronet. The animal shakes the feet frequently, and saliva hangs in strings from his mouth. He is too lame to roam far for his food, and his mouth too sore for him to eat freely, and so, is apt to lose condition very rapidly, and needs much strengthening diet. There is fever present, and the ulcers may extend even to the alimentary canal. The fatality due to this disease in India, is probably the result of starvation ; for cattle very seldom die from foot and mouth disease in England. An animal that has been exposed to the poison of foot and mouth disease generally takes from three to six days before the symptoms appear. In a cow affected the milk supply diminishes, and that which is left is liable to cause thrush and diarrhoea in those who consume it ; hence when this disease prevails it is always advisable to boil and strain the milk before use.

Treatment.—After attending to such measures as are necessary for the prevention of the extension of the disease among the healthy, the sick animals should

be duly cared for. They should be given liquid and nutritious diet, such as congee, milk, &c. Nitre should be given in the drinking-water. Internally a laxative composed of a pound of Epsom salts, and, if the animal be weak, some stimulant will also be of use. The ulcers should be washed antiseptically and kept clean. The mouth and tongue if much ulcerated, should be washed with a solution of alum or borax, the feet painted with neem-oil, carbolic-oil, and tar.

Pleuro-pneumonia is commonly known as a contagious lung disease. It is the most serious and fatal disorder of the lungs of the ox. It is not so frequent in India as Anthrax, Rinderpest, or Foot and Mouth disease. Diseases, such as simple inflammation of the lungs, or stomach, are apt to be mistaken for it, but it can at once be detected when the animal is alive by an experienced observer. There are all the symptoms of pain and fever of common inflammation of the lungs, but the cough is very diagnostic, and the animal in breathing gives a peculiar grunt. The breathing is much disturbed, the symptoms develop slowly, and generally lead to death. The poison of Pleuro-pneumonia is rather slow in its action. It is taken up through the lungs and takes two weeks to three months before any symptoms appear. The first sign in an animal getting this disease is that it puts on flesh and appears healthier than the rest of the herd. This gives place to fever, cough, discharge from nostrils, constipation, emaciation, difficult breathing and eventually death. When the body is opened, usually only one lung is much diseased, and it is swollen, green in colour, and has an unwholesome smell. When cut into, it looks like various coloured marble. There is much watery fluid and straw coloured bands in the chest, binding the lungs to the walls.

Treatment is of no avail when the disease has thoroughly established itself, but in the early stages, nutritious diet, change of pasture, nitre in drinking-water and oleaginous purgatives, such as linseed or gingelly oil and fomentations to the chest may do some good. The affected animals should always be removed from the healthy and preventative measures immediately adopted.

Tuberculosis is another very serious disorder, slow in its progress, and very fatal. It is remarkable for the number of different forms it assumes depending whether it affects the lungs, bowels, or other parts of the body. These become the seats of collections of diseased matter, which has a creamy or cheesy appearance, according as they are moist or dry. The progress of the disease is slow, and it is liable to be mistaken for others. Rapid wasting away is always present, and usually a distressing cough. Man may take this disease from eating the flesh, or drinking the milk of animals attacked by this disorder. Although cattle are most liable, other kinds of animals frequently suffer from it: well-bred cattle die from it most frequently, and it kills many calves.

Treatment.—An animal suffering from this disease has no cure, the disease lingers on and the animal dies. However, when there are objections to the immediate destruction of such animals, they may be much relieved by nutritious diet, mild purgatives and general good treatment.

Cow-pox, or VARIOLA, is a febrile contagious disease, resembling small-pox in man, but in the cow it does not lead to much distress. The animal shows symptoms of disease from six to nine days after the poison enters the system. Fever is present, and eruptions appear on the udder and teats, the vesicles at first are pointed at their centres, but soon become depressed, a red line is present

round each vesicle ; they gradually burst and dry up throwing off the scabs. The disease runs its course within ten to fourteen days. In very severe cases slight colicky pains and diarrhoea may be present. The milk from a cow suffering from variola should not be used.

Treatment. — Cooling diet, a small quantity of nitre in the drinking-water, and the application of carbolic-oil to the vesicles are all that is necessary. The cows affected with the disease should be regularly milked, and the milk thrown away. If the milk is allowed to remain undrawn, inflammation takes place in the udder.

Rabies. The bite of a rabid dog, is liable to cause rabies in cattle. The symptoms come on in two to three weeks and sometimes as many months after the bite has been inflicted. There is great distress and nervousness, the animal becomes frantic, convulsions set in, and death takes place.

The only treatment that might be adopted is that when a rabid dog bites an animal, to have the wounds enlarged and burnt with a hot iron immediately. The bite of any rabid animal is liable to convey the disease.

All contagious diseases run their course, and medicines are not of much use. We very often hear of cures for rinderpest, but no infallible cure is known ; some cases recover naturally, and the number of cures, and the severity of cases will be least among animals which are carefully nursed, well managed, and in healthy places ; also outbreaks of disease tend to die out of their own accord, and when this takes place, the measures which are tried as remedies are apt to be considered as having proved useful as cures, and mislead those not well acquainted with the peculiarities of disease of this kind. Although we cannot cure these

diseases, we may do much to assist nature in her efforts to throw off the poison ; firstly, by supporting the strength of the patient ; secondly, by arousing the kidneys, skin, liver, and bowels to action, and helping their efforts to purify the blood. Thus, whenever disease is prevalent in a district, or has broken out in a place, it may be useful to give healthy animals doses of common salt and nitre, also chiretta and sulphate of iron. And the same substances may also be given to animals affected with these diseases.

The carcases of animals dying of contagious diseases should be burnt whenever possible ; or, if buried, the skin should be slashed with a knife and the carcase placed deep in the ground, with some quick-lime both under and over it.

CHAPTER XIII.

DISEASES OF THE BRAIN AND NERVOUS SYSTEM.

Tetanus, or locked-jaw, is a disease characterized by tonic spasms, or stiffness of muscles, first commencing at the region of the face and then extending rapidly towards the other parts of the body. The first symptom of this disease is a disinclination for food, gradually the jaws become locked, there is dribbling of saliva, a straggling gait, protrusion of the fleshy covering of the eye and general stiffness are seen. There is also constipation, with difficulty of breathing. Tetanus is now believed to be caused by a germ; the disease often comes on after a wound, but it is not infrequent to see an animal suffering from locked-jaw without having any wound in its body.

Treatment should consist of complete rest and quietude. The animal should be placed in a darkened stall and should not be disturbed, except by the attendant, who ought, if possible, to avoid visiting the stall more than twice or thrice a day. A purgative of Epsom salts or oil ought to be administered, but if the jaws are stiff, the best plan would be to give the medicine in an enema, or some croton oil may be placed on the tongue. Full doses of bhang, given twice a day, are very useful, and chloral hydrate may be tried in the drinking water. The disease is very fatal and care should be taken in opening the carcases of animals dead of tetanus, as the germs are capable of causing the disease in man.

Paralysis is the loss of power and sensation in any part of the body; in cattle, it generally occurs in the hind quarters; it may be caused as a result of parturient apoplexy, fractures, growths in the brain, &c., and is also frequent in old animals and those grazed in damp pastures, or is due to the action of poisons.

Treatment—If due to a fracture, there is no use in treating the animal. If due to general weakness, good food, tonics, such as sulphate of iron and *nux vomica*, should be administered. A laxative dose of oil should be given in any case, and attention paid to the comfort of the animal, by giving him ample bedding in a well-ventilated stall.

Epilepsy is a disease characterized by fits of dullness, followed by staggering, falling, and convulsions, also bellowing and frothing from the mouth, and after these symptoms the animal gets up and appears to be recovered.

Treatment is hardly of any avail, a dose of purgative medicine, and nervine tonics, such as *nux vomica*, may be tried.

Apoplexy, Inflammation of the Brain, and Sun-stroke, are other diseases of the brain which appear, as it were, suddenly, and cause dullness, prostration, delirium and coma, followed by death.

Treatment—Is good nursing, and cold water to the head, purgatives and bleeding may be tried in such cases.

‘**Gid**,’ or turn-sick, is caused by the presence of a bladder-worm (cyst) in the brain. There is dullness, prostration, delirium and coma, usually followed by death.

CHAPTER XIV.

NON-CONTAGIOUS BLOOD DISEASES.

Hæmo-albuminuria, Red-water, Black-water or Muirill. Frequently occurs in cows just before or some days after parturition, though it is not uncommon to observe the disease in animals at other times. It is caused by the consumption of coarse, innutritious grass, and the disease is often aggravated by keeping the animals in damp, ill-ventilated stalls. The characteristic of this disease is the passage of black or red coloured urine, the animal becomes dull and listless, with fever, general weakness and diarrhoea, followed by costiveness.

Treatment should consist, in the first place, of the removal, if possible, of the patient to a better locality, free from dampness and moisture, administration of nutritious diet, such as milk, congee, &c., a purgative dose of Epsom salts or oil, and nitre in the drinking water, also doses of chlorate of potash, and small doses of stimulants, as arrack, nitrous æther, &c., generally prove useful.

Rheumatism is a disease characterized by a swelling of the structures of the joints, unlike other swellings, this being due to a poisonous state of the blood. It has the property of disappearing from one joint and then coming up in another; some animals have a special tendency to rheumatism, but the disease generally affects those kept in damp, ill-ventilated stalls. The animal shows great pain and will be extremely lame; there is fever with constipation, and very scanty, acid urine, and general dullness. If the disease progresses, it may cause ulceration of the joints and stiffen them.

Treatment.—The patient should be removed to a dry, well-ventilated stall, and nutritious diet given; a pur-

gative dose, and nitre and chlorate of potash, are of much use; also opium and aconite. Externally, the swellings should be fomented and rubbed with an ointment containing camphor, say one part of camphor to eight of oil or lard.

Polyuria or Diabetes is not very frequently met with in cattle. The disease is characterized by the passage of large quantities of watery urine; there is great debility and wasting, thirst and loss of appetite, and the animal will be seen to lick the walls of the stall. The disease is caused by bad food.

Treatment—Nutritious diet, a mild aperient composed of oil, doses of soda bicarb., and iodine and opium are of service.

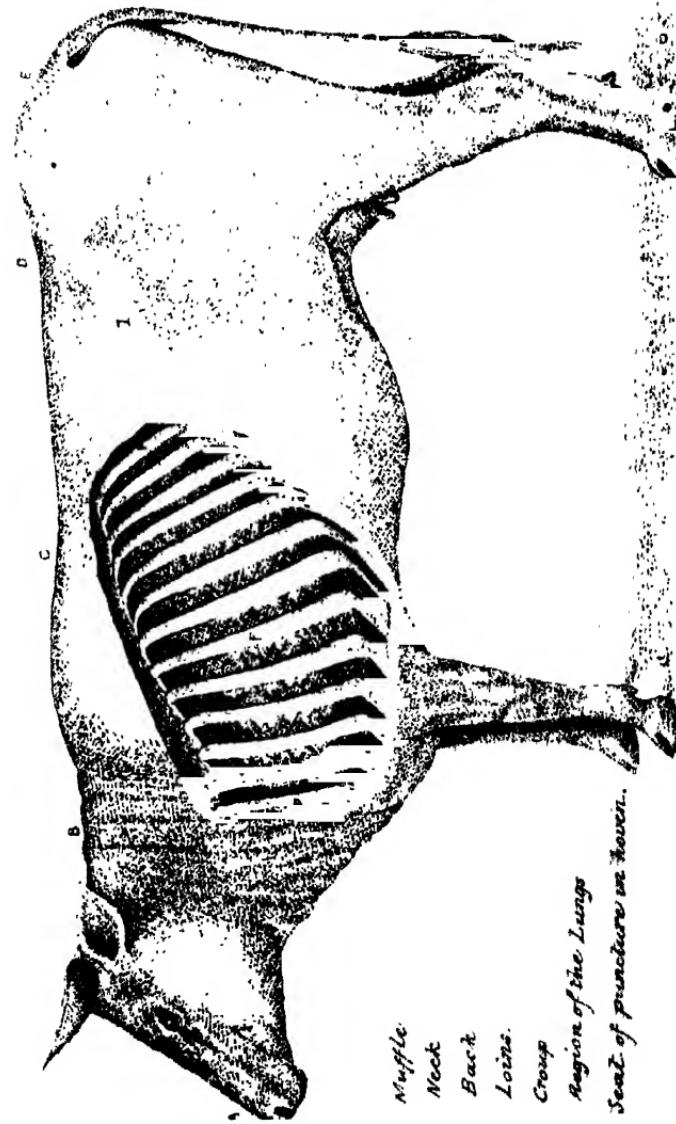
Uræmia is the poisoning of the system caused by the presence of the constituents of urine in the blood, through its non-secretion, either owing to disease of the kidneys or a deficient supply of drinking water. In uræmia there is profuse sweating, and the sweat has the smell of urine, coldness of the body and brain symptoms, giddiness and coma supervene and death takes place. If due to a deficient supply of drinking water, the treatment should consist of giving the animal pure water to drink, and stimulants and nutritious diet often prove useful, but death usually ensues.

Anæmia is general poorness of the blood. The animal, either through a deficiency of food or some wasting disease, loses condition rapidly. The mucous membranes become pale and the blood, when examined, appears to be colourless.

Treatment should consist of a liberal supply of nutritious food, and tonics such as chiretta, gentian, sulphate of iron, &c.

Dropsy, or effusion of serous fluid into the loose structures of the body, results from an anæmic state of the blood. It should be treated by tonics and diuretics, such as nitre and iron, laxatives, as small doses of Epsom salts, and iodine.

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CHAPTER XV.

DISEASES OF THE RESPIRATORY SYSTEM.

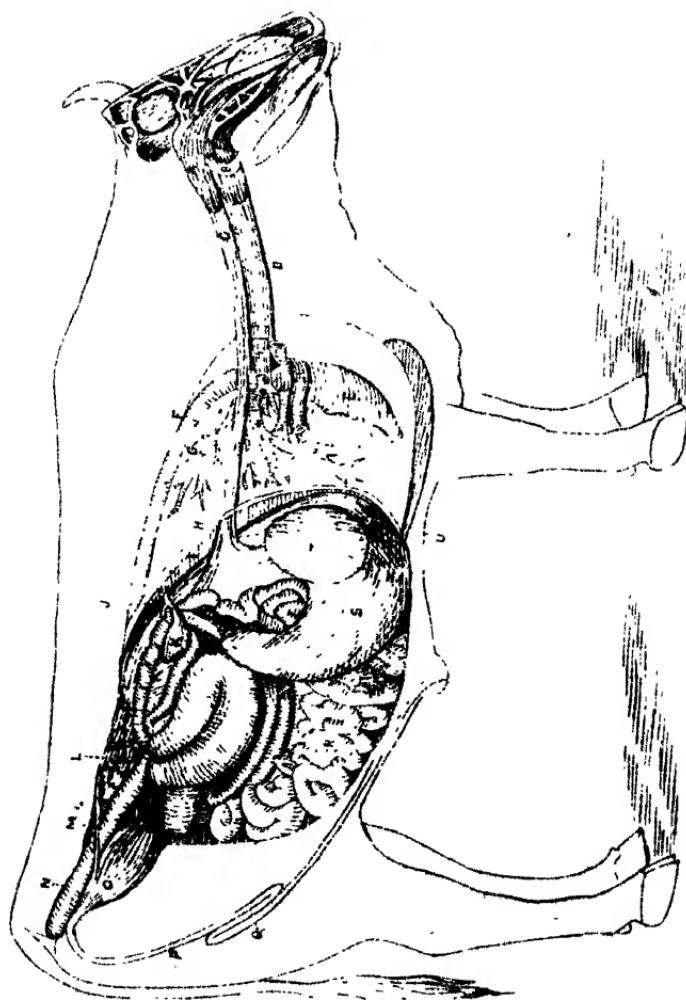
Catarrh or cold is inflammation of the membrane lining the nose, which often extends so far as the windpipe, and even the lungs. It is caused by exposure to wet or cold or by changes of the atmosphere. The first symptoms being those of dullness, staring coat and a dry muffle, with a discharge of mucus from the nostrils. There is slight fever and some constipation of the bowels, also a slight cough.

Treatment consists greatly in the proper nursing of the animal ; he must be placed in a well-ventilated stall and given plenty of bedding. The diet should consist of such laxative food as congee, green grass, &c. A little nitre given in water generally relieves the fever. If constipation be persistent, a dose of Epsom salts should be given along with a little stimulant. Steaming the head relieves the animal greatly. If not properly treated, catarrh leads to complications of the lungs. There is a severe form of catarrh prevalent in some districts of the country, which soon takes a serious turn and proves fatal to animals; such cases should be carefully attended to.

Inflammation of the lungs. When the lining membrane of the tubes of the lung (Bronchi) are inflamed the disease is known as *Bronchitis* ; and when the structure of the lung itself is inflamed it is *Pneumonia*. The inflammation of the membrane investing the lung is called *Pleurisy*. However it often happens that all three structures are more or less affected when an attack comes on.

Inflammation of the lungs takes place often by the extension of catarrh; sometimes it is due to blows or

- A. Pharynx.
- B. Esophagus.
- C. G. opharynx (esophagus.)
- D. Trachea (Windpipe.)
- E. Heart.
- F. Posterior Aorta.
- G. Bronchi.
- H. Diaphragm.
- I. Liver.
- J. Bumpon.
- K. Gall bladder.
- L. Kidney.
- M. Ureters.
- N. Rectum.
- O. Bladder.
- P. Urethra.
- Q. Bend of the Urethra.
- R. Intestines.
- S. Abomasum (4th Stomach.)
- T. Omasum (3rd Stomach.)
- U. Reticulum (2nd Stomach.)



properly, a small hand should be introduced through the mouth to the pharynx and the obstruction removed ; however, when the obstruction is in that portion of the gullet which is in the chest cavity it becomes a serious case. The next step is the passing of a probang ; if this is not procurable a strong rattan six to seven feet in length, with the end well wrapped round with a piece of cotton or rag, should be used. A gag must be placed in the animal's mouth, and after holding the head horizontally with the neck, the probang or the rattan, smeared with some oil, should be gently passed in. When it comes against the obstruction, the operator must attempt to push it forward gently, in all cases care being taken to avoid violence. If unsuccessful in the first attempt, the probang should be tried several times, after short intervals. In the meantime if tympany, or distension of the rumen with gas takes place, the rumen should be punctured with the trocar and canula.

Puncturing the Rumen.—The distension is seen in the left flank, the first stomach being situated in that region. The puncture should be made at a point between the last rib and the point of the hip, and below the back bones in the region of the loins (*lumbar vertebrae*). The puncture is made with an instrument called the trocar ; it is a pointed rod of steel, about eight inches long and a quarter of an inch in diameter, fitted with a handle. The metal rod is cased in a thin circular metal tube, the canula, leaving only the point exposed. The skin is drawn to one side and held tense, then the puncture is made with the trocar. After it penetrates the rumen, the trocar is withdrawn leaving in the metal tube, and the gas which is found in the stomach escapes through it. In an emergency where there are no instruments and where an animal's life is in imminent danger through tympany, the rumen

may be punctured with any pointed instrument, a knife and a piece of thin hollow bamboo inserted to serve the purpose of the canula.

For some days after the obstruction is removed, the patient should be carefully fed on sloppy diet, till the gullet gains tone again, else choking may recur.

Hoven is distension of the rumen with gas. It is caused by the fermentation of food in the stomach, generally following the consumption of watery green food, such as tender grass, &c. It also frequently happens when the animal is in a state of debility, owing to disease, the digestion being weak, and the stomach tardy in performing its functions, the food decomposes readily and gives out gases. The symptoms consist in a swelling in the left flank which increases rapidly and when tapped with the fingers gives a drum-like sound. The animal suffers great pain, is restless and there is difficulty of breathing. If not relieved he dies of suffocation or through blood-poisoning, caused by the absorption of the noxious gases evolved in the stomach.

Treatment. In the early stages, before the disease takes a very serious turn, exercise, hand rubbing, internal absorbents, and stimulants, as ammonia, turpentine, charcoal powder, assafoetida, ginger, and fenugreek are of much use. As soon as the distressing symptoms are relieved a strong purgative should be administered, and attention paid to the diet for some days.

If all attempts at treatment fail, or if the patient is seen in the last stage, the rumen should be punctured to give relief as directed at page 89.

Impaction of the Rumen.—The rumen, or the first stomach, is often impacted with undigested food. This impaction is frequently caused by the consumption of

coarse tough grass, insufficiency of drinking water, and sometimes through eating large quantities of grain. The stomach gets distended and soon refuses to act. The mass of accumulated food begins to ferment. The symptoms are swelling of the left flank, which when percussed gives a dull sound and pits when pressed. There is great distress and pain, difficulty of breathing, moaning, &c. If not relieved the patient dies of suffocation.

Treatment ought to be prompt; a large purgative dose should be given, and in addition some drug as turpentine, assafoetida, ammonia, &c., to check fermentation. Enemas of linseed oil are also useful; when the purgative acts the animal is relieved and he should be carefully fed for some days. However if the medicines do not act, recourse should be had to opening of the rumen.

Ruminotomy or opening of the rumen is performed at the left flank between the point of the hip and the last rib, and below the bones of the loins. An incision about six inches long should be made vertically between the two points indicated. After opening the flank, the stomach will come in sight, its walls should next be opened. A piece of cloth should next be placed in such a manner as to prevent any matter from the stomach getting between it and the outer layer of tissues, having done this, the hand is inserted and the contents of the stomach removed; next a dose of linseed oil and some gruel should be poured into the stomach, and the cut carefully stitched with catgut or silk thread, then the cut in the flank is sutured and dressed with carbolic oil.

Impaction of the third stomach or fardel bound. The third stomach is oval in form and contains within it a number of folds like the leaves of a book, where

the particles of the food get thoroughly mixed up. Impaction of this stomach is caused by coarse grass which animals are compelled to eat during a season of scarcity or drought. One of the first symptoms of this disease is the cessation of rumination, the animal becomes dull and listless, there is difficulty of breathing and grunting at every breath, the bowels become constipated, and now and again small quantities of liquid dung, in which is seen dark-coloured pieces of hardened fodder, is passed. Within five to fifteen days, the disease takes a serious turn, the pain increases and death follows.

Treatment should consist in the giving of large quantities of liquid gruel and a very strong purgative, such as croton oil or large quantities of Epsom salts. The purgative should be repeated in half a dose if it does not act the first time. Small quantities of stimulants given repeatedly and fomentations to the belly are of much benefit. When recovering the patient should be carefully dieted, giving him easily digested soft food, as green grass, bran, &c.

Diarrhoea or looseness of the bowels, is caused by irritation of the intestines, generally following a change of pasture, unwholesome food, poisonous plants or foul water. It may also occur after an overdose of a purgative medicine, or may be seen in the last stage of some specific disease as pleuro-pneumonia. The symptoms are not very urgent, there is passage of liquid faeces and hardly any constitutional symptoms in the early stages, but if the disease continues the animal becomes debilitated, ceases to ruminate and shows signs of general pain.

Treatment, though not very urgent, must be mainly directed to the removal of the cause. Change of pasture and food is essential. The diarrhoea should

not be checked at once as it is an effort of nature to get rid of certain effete matter from the system. Stimulants as arrack and ginger in the early stages may do good, or a laxative drench, such as a pint of linseed oil with an ounce of opium, may be given. If the diarrhoea still continues after the laxative has acted, then it is advisable to give an astringent, combined with some stomachic; for this purpose a drench containing aniseed, ginger, gentian, sulphate of iron and opium dissolved in arrack would be of much use.

Dysentery or *bloody flux* is the passage of bloods mucus, and pus along with the dung and is caused by inflammation and ulceration of the bowels. Dysentery sometimes follows diarrhoea, but is more frequently spontaneous and caused by unwholesome food, foul water, and exposure to chills or heat. Bloody flux is also seen in the last stages of Rinderpest. The symptoms are the passage of liquid dung mixed with blood, mucus and pus. Violent straining, colicky pains, fever, and often yellowness of the membranes of the eyes and the mouth.

Treatment. Liquid diet, and hot fomentations. Internally a laxative, combined with a stomachic and sedative, such as a drench composed of linseed oil, opium, ginger, and arrack. If the straining be violent enemas containing opium, dhatura, &c., should be given; later on some astringents, such as catechu, sulphate of iron, or gall-nuts may be administered along with stomachics and stimulants.

White Scour or skit is a disease confined to calves before they are weaned, and is the passage of liquid dung which has the appearance of milk. Various reasons are given as to its cause, but there is no doubt that like diarrhoea it is due to irritation of the bowels.

The symptoms are the passage of white liquid dung, with general dullness and wasting of the calves.

Treatment. In the early stages an ounce of castor or linseed oil, with three or four grains of opium and bicarbonate of soda will be of much use. If this does not give relief a little more powerful astringent, as chalk, may be tried, along with a stomachic as aniseed or ginger. Attention should also be paid to the diet, and thin liquid gruel may be given along with the milk.

Colic or abdominal pains, as a distinct disease is rare in the ox. Colic is a symptom accompanying very frequently diarrhoea and dysentery. However it may occur through irritation of the intestines, undigested food, or the accumulation of gases. It is sometimes continuous and at other times spasmodic or coming on by fits. There is great abdominal pain and the animal becomes restless, lies down and gets up.

Treatment. A purgative combined with opium and stomachics, as ginger, gentian, &c., is of much use. Ammonia, turpentine, assafœtida and arrack are also useful drugs in treating colic. Attention should be paid to the diet of the patient.

Enteritis or inflammation of the bowels often follows an attack of colic. It may also be caused by the taking of cold water when the animal is heated or as a result of a drastic purgative. There is continual colicky symptoms and fever and constipation present.

Treatment. Liquid food such as congee, fomentations, large and repeated doses of opium are useful, enemas of soap and warm water and oil should be given several times. The disease is very fatal.

Twisting of the bowels is very seldom seen in the ox, the symptoms resemble those of enteritis and the disease is incurable.

Jaundice or yellows, is a disease due to disorder of the liver, either through obstruction or inflammation, when the bile circulates in the blood and acts as a poisonous body. The disease is caused by bad food and keeping animals in ill-ventilated stalls or on marshy land. It also occurs from change of climate. Animals imported from Europe are specially liable to this disease in India.

The symptoms of Jaundice are yellowness of all the visible mucous membranes and general listlessness. There is constipation of the bowels, the dung passed having a white or clay coloured appearance. The urine is scanty and high coloured. When inflammation of the liver is present, there are also constitutional symptoms such as fever and thirst and pain on pressure at the right side of the abdomen close to the chest.

Treatment. In the early stages an oleaginous purgative, combined with calomel may be given. Attention to diet, doses of ammonium chloride, with nitre and Epsom salts are of much use. When the acute symptoms disappear tonics and liberal diet should be given.

CHAPTER XVII.

DISEASES OF THE URINARY AND GENERATIVE SYSTEMS.

Nephritis or inflammation of the kidneys is caused by the administration of irritant medicines as cantharides or through taking poisonous plants along with the grass. It may also be caused by injuries or blows to the loins. The disease is rare in the ox.

The symptoms consist of general fever, hurried breathing, and sometimes constipation. The animal stands with arched back, evinces pain on pressure over the loins, staggers when made to move, passes small quantities of thick urine, and shows great pain in its efforts at urination. If the disease is not arrested the symptoms increase in virulence and the patient dies of blood poisoning caused by the circulation of effete matter in the blood.

Treatment should be prompt; a strong purgative, preferably oil, should be administered, gruel and opium, with hot fomentations to the loins, greatly relieve the pain.

Cystitis, inflammation of the bladder and its causes, symptoms, and treatment is much the same as in nephritis. In addition to the symptoms seen in nephritis there is often present colicky pains, but hardly any pain is evinced on pressure on the loins.

Calculi or concretions are occasionally seen in the bladder and the urethra and sometimes in the sheath of the penis. These produce difficulty in urination and even death when undetected. When any matter is found in the sheath it should be properly cleaned and the foreign body removed. If the concretion can be detected in the urethra it can be removed by cutting through the structures of the penis. When in the bladder, its re-

removal is a difficult matter, but two dram doses of hydrochloric acid or half ounce doses of vinegar internally may be tried with a view to reduce the calculi by their action. An operation known as LITHOTOMY is performed in such cases. It consists of cutting into the urethra at the perineum, and passing a metallic rod and subsequently a pair of specially constructed forceps into the bladder and removing the offending body and syringing out the bladder with a long nozzled syringe. The wound made in the perineum is closed with sutures and dressed with an antiseptic solution. In the cow the forceps is passed through the urethral opening in the vulva into the bladder and the calculus extracted. This operation is attended with much difficulty and is successful only under practised hands.

Diabetes. Polyuria, or profuse urination, is caused by bad musty food, rank grass or foul water. The disease is characterized by a profuse discharge of watery urine. The animal becomes dull, the mucous membranes pale and the bowels torpid. There is excessive thirst, and as the disease advances the patient rapidly loses strength.

Treatment. Change of diet, large quantities of pure drinking water and a laxative should be given daily; later on dram doses of Iodine, also vegetable and mineral tonics such as Nux Vomica, Cinchona, Sulphate of Iron, or Sulphate of Copper, should be given.

Orchitis, or inflammation of the testicles, often occurs in the bull from injury and sometimes through excessive copulation. There is much pain and heat in the part and fever is present.

Treatment should consist of hot fomentations, bandages to suspend and relieve the inflamed testicles and the application of a soothing ointment of belladonna (one part of extract belladonna to eight of fat or lard). Internally purgatives and diuretics.

It sometimes happens owing to injury to the scrotum that the testicles get exposed. In such cases the animal should be castrated.

Castration. When it is decided to castrate an animal, he should be prepared for the operation by withholding a portion of his food the previous day, so that he may not be thrown on a full stomach. The animal is thrown and properly secured. The operator taking a sharp scalpel, holds one of the testicles tensely in the scrotum with one hand and with the other cuts the skin and the coverings with a bold incision. The testicle is now exposed. Next the clamps, which are usually made of iron but which could be made by securing two pieces of smooth wood together, are put on the cord to which the ⁴ testicle is attached. The anterior portion of the cord contains blood vessels whilst the posterior is muscular, so before putting on the clamps the posterior muscular portion may be cut with the knife, care however being taken not to injure the anterior portion. After the clamps are properly secured, the cord is separated by twisting, by holding the testicle with specially made forceps. The twisting, which should be done slowly, breaks the cord and so acts on the coats of the artery that it gets completely blocked up. Instead of twisting, the cord may be scraped with a knife, or severed with a hot iron. After removing both the testicles and cleaning the parts well, the wound in the scrotum should be dressed antiseptically, preferably with some carbolized oil. The surrounding parts may be smeared with some neem oil to keep away flies. After leaving the wounds for a day or two, without disturbing them in any way, they should be daily cleaned with tepid water and dressed antiseptically, till they heal up, which does so within two to three weeks.

Gonorrhœa, or "*bull burnt*," is a disease of the urethra and the termination of the penis. There is much inflammation and discharge of thick mucus and pus, the animal suffers great pain, moans, champs the jaws and stamps the feet, and there is much constitutional disturbance with high fever. If not arrested, abscesses and sinuses may form. The animal evinces great sexual excitement. A bull suffering from gonorrhœa is liable to convey the disease to the cow.

Treatment. The affected parts should be thoroughly cleaned, any abscesses or sinuses cut open, and the whole dressed antiseptically with carbolic oil. Internally febrifuges such as nitre, and purgatives as Epsom salts should be given.

Leucorrhœa, or inflammation of the vagina, is sometimes seen in cows due to gonorrhœa of the bull or general debility. The disease is characterized by a white mucous discharge, sometimes with more or less constitutional symptoms. There is much sexual desire, but if covered, a cow seldom becomes pregnant.

Treatment should consist in the cleaning of the parts and the application of antiseptics, as Condy's fluid (solution of potassium permanganate) and weak astringent solutions as alum or borax. Internally nutritious diet, and tonics should be administered.

CHAPTER XVIII.

PREGNANCY, PARTURITION, AND PARTURIENT DISEASES.

Sterility. Some cows are barren and do not produce any offspring. This barrenness or sterility may be due to defects or disease of the sexual organs, old age, change of climate, insanitary surroundings, overfeeding, or want of food, and fatness. When owing to the first mentioned causes, *i. e.* defects of the sexual organs or old age, there is no remedy; but when due to bad sanitary surroundings or food, the cow may become fertile after the causes are removed.

Pregnancy is the bearing of young. A cow when pregnant may be known by certain signs she evinces. For instance, there is a change in her temperament, she often refuses the bull, becomes gentle and has a tendency to fatten, there is also loss of vigour and depraved appetite. Other signs are increase in volume of the abdomen, prominence of the udder and appearance of milk, alteration of urine, swollen condition of the mucous membrane of the vulva and vagina and mucous secretion from the generative organs.

During the period of pregnancy a cow must be gently treated, and attention paid to cleanliness, food and water; and regular exercise given.

Abortion, Slinking or slipping, is the expulsion of the foetus before it has attained sufficient development. Abortion may be caused by changes of weather, bad and indigestible food and filthy water, by poisons or medicines such as violent purgatives, injuries or blows, or uneven stalls, conveying the animal by railway or boat, excitement and fear. It also occurs owing to the weakening influences of certain diseases, especially epizootics and diseases of the stomach, and as a result of contagion from other cows. To prevent abor-

tion, the causes which produce it should be avoided, and attention paid to the proper treatment of the animal. When a cow is very prone to it she should be allowed a season's rest before she is again put to the bull.

Parturition is the act of bringing forth or delivering the young. The early signs of the nearing of parturition are enlargement and increased sensibility of the udder, swelling and flabby condition of the vulva and vagina with a mucous discharge, the abdomen becomes pendant and the flanks look hollow, there is restlessness, and the animal seeks a quiet place. In the *second stage* the restlessness increases, skin becomes hot, urine and faeces are passed frequently, labour pains come on at intervals of fifteen minutes and the water bag appears at the vulva. In the *third stage* the labour pains become severe, the cow contracts the muscles of the abdomen, brings her limbs under the body, arches the back, elevates the tail, flexes the hocks and propels the foetus, the water bag ruptures and the calf is delivered.

It must be mentioned that the *water bag* consists of the coverings of the foetus with the fluid found in it. These coverings are three in number. Immediately covering the foetus there is the *amnion*, this secretes a fluid in which the foetus as it were floats, covering the amnion there is another membrane, the *allantois*, and lastly the *chorion*. The chorion is attached to the membrane of the uterus by certain large projections termed *cotyledons*.

The usual manner in which the foetus appears during delivery, is the head placed on the two forelegs.

Abnormal presentations. It sometimes happens that instead of the foetus coming out in the normal or natural way, it comes in other positions, and more or less

makes its expulsion difficult. In such cases delivery should be assisted by bringing the foetus into a proper position. But the person doing this ought to be careful not to injure the mother or foetus, and should always rub his hands and arms with oil mixed with a proper antiseptic. Sometimes no amount of manipulation will bring the foetus in position and in such cases, in order to save the cow, the foetus should be cut and removed in parts ; this operation is called *embryotomy*.

After delivery the cow should be kept comfortable, and after rubbing her body and giving plenty of clean litter and tepid gruel, she should be left alone for an hour or so.

The calf. The calf if born with the membranes on, should be freed from them, if the cord (umbilical) is not ruptured, it should be severed ; its mouth and nostrils should be cleared of any mucus, and should be placed near the mother for her to lick. It should be allowed to take the first milk, which acts as a purgative, if not, it ought to be given a little castor oil or some honey and water.

Retention of the Membranes. The membranes in which the foetus is enveloped are sometimes retained in the uterus, this usually occurs in old cows, and often in cases of abortion. Milking or allowing the calf to suck too soon after delivery, is also said to be a cause of retention. It is not very serious in the cow. If they do not come out within a day they should be gently removed by introducing the hand, after due antiseptic precautions, into the womb, and the womb washed out with a solution of Condy's fluid.

Inversion of the Vagina. This usually occurs before parturition. Is due to debility. Treatment should consist in bathing the part with cold water

and returning the inverted portion carefully, and lastly securing it by a truss. The truss can be formed by the application of a pad of cotton or tow wrapped in a towel and kept in position by a rope, which is first doubled and a loop with a knot formed for the neck, the two ends of the rope are taken along the back, and another knot made which should go below the tail, the pad is then placed pressing on the vagina and the two ends again formed into a knot just below it, so that the pad may not slip through them ; next the ends are taken below and brought forward along the abdomen ; when half-way the ends are taken up and passed through the respective ropes running along the back, they are then tightened and attached to the neck loop. After attending to the truss the animal should be given good food and tonics.

Inversion of the Uterus.—The womb is sometimes inverted after the calf is born and hangs out from the vulva. It is generally seen in debilitated animals and often results through excitement.

Treatment. The organ should be washed and cleaned of all dirt and foreign bodies, and should next be pushed in by pressing with the fist, two persons at the same time assisting by pressing it forward with a folded cloth. This is often a matter of difficulty. When once returned the hand should be kept in for a time to prevent the expulsion of the womb a second time, and a truss as described before put on. Internally opium is very useful in such cases. The cow should not be allowed to stand on a slanting floor, but should be placed in such a position as to keep the hind quarters elevated.

Inversion of the Bladder.—Owing to great expulsive efforts in the act of parturition sometimes the bladder is inverted, it appears like a tumour at the vulva and there is constant dribbling of urine.

If taken in the early stage the bladder may be returned with gentle pressure, otherwise if the organ is at all inflamed it sometimes is impossible to return it. It may be removed by an operation, but a cow, without the bladder even when she survives this, will have a constant dribbling of urine.

Metritis, or inflammation of the womb is due to either over-fatigue before parturition, wounds of the uterus and vagina, retention of the membranes leading to their decomposition, or general debility and exposure.

The symptoms consist of great restlessness, loss of appetite, suppression of milk, contraction of the vulva and a purple hue of the mucous membranes of the vulva and vagina. The patient lies down, rolls on the ground, stupor sets in and death ensues. The inflammation in this disease rapidly extends to other sensitive membranes, and generally death results from blood poisoning.

Treatment. Antiseptic applications as Condy's fluid and carbolic oil to the uterus, fomentations; internally opium and alcohol are beneficial.

Parturient Apoplexy or dropping after calving, is a disease following parturition in cows. Cows in a plethoric condition are most liable to this disease, and it occurs more usually in good milkers and at the third parturition. The first sign of this disease is fever, occurring usually one to three days after parturition, the milk dries up, bowels become costive, and the cow completely exhausted falls to the ground, there is loss of sight, general listlessness, delirium, paralysis, which if not relieved, will end in coma and death.

Treatment should be immediate, if the cow is plethoric, bleeding should be resorted to, next a brisk purgative ought to be given in the form of an enema.

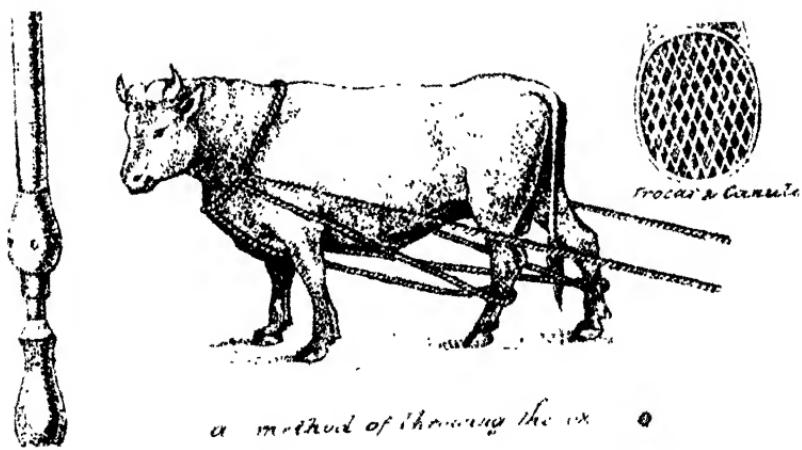
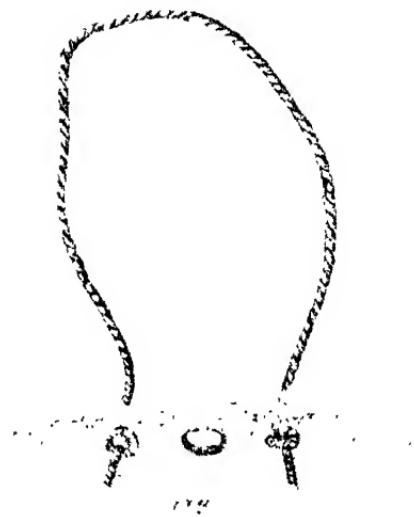
Care should be taken not to administer medicines through the mouth as on account of the paralysis of the different organs, they are likely to run down the windpipe and cause serious disease in the lungs. Liquid and nutritious diet as milk and eggs should be given in enemas. Ample bedding and changing the position of the cow, to prevent the occurrence of sores, cold water to the head, small doses of stimulants, such as arrack and nitrous ether, and blisters along the back are useful. Even after recovery paralysis of the hind quarters may remain, when the cow should be treated with nerve tonics as *nux vomica*. The occurrence of the disease may be prevented by giving exercise and mild oleaginous purgatives during pregnancy, and attention to diet to prevent the cow from getting plethoric.

Mammitis, Garget, or inflammation of the udder, is frequently seen in young cows of a plethoric condition. The inflammation may be confined to one or more quarters of the udder, or the whole organ may be inflamed, the disease may appear just after calving, but is not unknown after this. It is due to exposure, injuries, obstruction to the flow of milk, neglecting to empty the udder, or as a complication in epizootic diseases.

Symptoms :—Heat, pain, redness, and swelling are observed in the udder. The animal goes lame in one hind leg, there is fever, increased respiration and loss of appetite. The milk becomes thin and yellowish and later very foetid. The inflammation very often runs on to the formation of abscesses, and sometimes portions of the udder slough off.

Treatment.—Removal of all milk from the udder, fomentations, poultices containing belladonna, and the udder supported by a broad bandage. A liniment of

belladonna and oil (one to eight) may be used with advantage. Internally the patient should be given a strong purgative, also large doses of nitre in its drinking water. If abscesses form they should be opened and the wounds treated antiseptically. Sometimes the disease becomes chronic and a part of the udder gets hardened.



CHAPTER XIX.

FRACTURES, ACCIDENTS AND DISEASES OF EXTERNAL
STRUCTURES.

Fractures.—A fracture is the breaking of a bone either wholly or partially. It is due to injuries, violence, blows, falls, &c. Symptoms:—The division of the bone can often be felt, and there is loss of shape, and, if in a limb excessive lameness, and crepitating sounds are heard at the seat of fracture when the limb is moved.

Treatment.—Bring the parts together and keep them there by means of splints and bandages. Allow absolute rest, open the bowels, and give light diet. As a rule, however, fractures do not heal in a satisfactory manner owing to the difficulty in keeping the limb in perfect repose. In severe fractures amputation may be resorted to.

Dislocations.—Certain joints, especially of the limbs, get out of their place owing to violence or straining. The common seat of dislocation in the ox is the joint at the haunch. The head of the bone which fits into the socket of the haunch bones slips either forward or downwards. There is deformity of the limb and the end of the bone which has slipped out can be felt. If unattended with fracture, an attempt should be made to bring it back to position and keep it there. In young cattle the *patella* at the stifle joint, the joint just close to the flank, often slips backwards. It can be brought back with little effort. For some time the animal should be kept secure to prevent the re-slipping of the joint. This is best done by passing a rope round the neck and on to the pastern of the affected limb.

Bony deposits.—Inflammation of the bones often takes place as a result of injury or sometimes due to a

tendency to tubercular disease. As the result of inflammation sometimes death of the bone takes place, at other times the inflammation disappears leaving a bony deposit on the place. In the ox these deposits are not of much consequence. An application of a smart blister containing biniodide of mercury and lard (one to eight) often reduces the deposits.

Sprain is the term used to denote a strain on any soft structure. A muscle, a tendon, or a ligament may be strained in such a way as to cause much pain and swelling through a blow, injury, or slip. In all sprains there is extreme pain and difficulty of movement, with heat and swelling of the part.

Treatment should consist in keeping the part at complete rest and irrigation with cold water; the water can be made very cold by dissolving in it some chloride of ammonium and common salt. After the heat disappears, a smart blister composed of biniodide of mercury and lard (one to eight) ought to be applied to the part. If the blister does not give relief the part may be fired with hot iron.

Wounds.—A wound is a recent severance of a soft tissue, through injury, a blow, or a cut with a sharp or a blunt instrument. According to the degree of the injury there will be exposure of tissue, bleeding, and pain.

Treatment.—In the treatment of a wound the first step is to clean it thoroughly; all dirt and foreign bodies should be carefully removed. If there be bleeding it should be checked by bringing pressure on the blood vessels supplying the part, by tying a tight bandage immediately over it. In the wound itself the vessels if discernible, should be tied with silk thread, or twisted by catching their ends with forceps. Applications of cold water also assist in checking bleeding,

or hot iron is gently applied, or styptics such as perchloride of iron, alum, &c., are useful. After bleeding is stopped the next step is, if the wound be a clean cut one, to bring the edges together and keep them in position by sutures or stitches; the edges however should not be brought together very tight, and in all cases sufficient space should be left at the lower-most portion of the wound for the easy escape of any matter which may form in it. If it is not possible to suture the wound it should be kept as it is, but covered loosely with a piece of cloth to prevent flies and dirt getting in. All water used in the washing of wounds should contain dissolved in it some carbolic acid, or corrosive sublimate, the strength of carbolic acid solution is one to thirty and up to fifty; that of corrosive sublimate one to two thousand. If the wound is in any way extensive, a little tow dipped in carbolic oil may be placed over it or stuffed in it loosely. The wound should be cleaned and dressed daily. In the healing process if the formation of new flesh be very great and is likely to spread over the sides, or if the formation be very slow, the parts should be touched with silver nitrate or sulphate of copper.

Abscess.—An abscess is the formation of matter under the tissues. There is swelling, heat, pain, and the presence of fluid is felt. It is caused by irritation, pressure, injury, or some predisposition brought about by some alteration in the blood.

Treatment.—An abscess in the early stages should be encouraged to fester or form, by hot fomentations and the application of mild blisters, or stimulants. When it is pointing, a depending orifice should be made with a sharp pointed knife, all the matter removed and the abscess washed out antiseptically. A plug of tow dipped in carbolic oil should be put in the opening made and the wound dressed daily.

Ulcers.—An ulcer is an old standing wound either caused by injury, resulting from an abscess, or the degeneration of the part itself. There is an exposed surface, generally excavated, with matter of an unhealthy character coming out of it.

Treatment.—Thorough cleaning and removal of pus and other matter. If the growth of new flesh be tardy the surface should be touched with nitrate of silver, sulphate of copper, or washed with a solution of alum or borax. Subsequently it should be dressed antisep-tically with some carbolic oil or with corrosive subli-mate solution.

Tumours.—A tumour is an abnormal growth in any part of the body ; it may be a bone or a soft structure. It is caused by pressure, injury, or a blow, and sometimes the result of predisposition. A tumour does not often give pain unless it is subject to pressure. Hence tumours on the neck of working bullocks require treatment.

Treatment.—The skin should be carefully dissected over the tumour and the hardened mass scooped out with the knife, and the wound treated in the ordinary way.

Sometimes there are very troublesome tumours which grow again and again after they are removed ; such tumours after removal should be thoroughly cauterized at their base with some acid or with hot iron.

Cancer of the horn is a disease common in some parts of India. The horn becomes diseased at its root and droops, the progress of the disease undermining the surrounding tissues extends through the horn-core to the brain and the animal eventually dies in great pain. The cause of this malady is not properly known, but it is now believed to be caused by a certain parasitic fungus known as the ray fungus (*Actinomycosis*.)

Treatment.—The horn should be removed and the wound dressed with caustics as sulphate of copper, nitrate of silver, or powdered arsenic. If the wound becomes healthy and the progress of the disease stopped, it should be treated in the ordinary way. The internal administration of potassium iodide is said to be beneficial in this disease.

Lumpy jaw.—Sometimes thick bony tumours appear on the jaw and the side of the neck, increasing rapidly. These suppurate, causing great pain to the animal, and often death results. This disease is also caused by the ray fungus (Actinomycosis.)

Treatment.—Remove the tumours whenever possible; and give internally iodide of potassium which is said to be a specific in such cases.

The ray fungus can be communicated from the sick to the healthy and it is well in both the above diseases to take precautions to prevent its spread. The disease is even said to affect man by the consumption of meat containing traces of the fungus.

Hernia is a term usually employed to denote the protrusion of the bowels out of their proper cavity, and is caused by violent straining, falls, or found at birth. There are different forms of hernia.

Umbilical Hernia, or the protrusion of the bowel at the navel, is of very common occurrence in young calves; and is often found to exist when a calf is born. There is a tumour-like protrusion at the navel which recedes when pressed.

Treatment. The protruded bowel should be reduced, after putting the calf on its back, and the navel tied tightly with a strong waxed cord. Inflammation is thus set up, the portion of skin sloughs off in a few days,

adhesions take place and the bowel no more comes out. Instead of tying, the skin may be enclosed tightly in a wooden clam.

Scrotal Hernia, or the protrusion of a portion of the bowel into the scrotum, sometimes takes place in the bull. This hernia is dangerous ; the intestine is liable to be strangulated and thus creates a stoppage. There are violent colicky symptoms, the animal evincing great uneasiness ; it is often difficult to detect the protruded bowel, but careful examination of the scrotum and exploration by the rectum will usually reveal the lesion. Unless the animal be relieved within a few hours, there is no hope of recovery taking place.

Treatment.—An attempt should be made by manipulating externally and through the rectum to reduce the hernia, but this frequently is not attended with much success. Otherwise the animal should be immediately castrated by the covered operation. This consists of opening the scrotum without cutting through the last structures which cover the testicles. A small slit is next made in these structures sufficient to admit the fingers, into this a hidden knife is passed up to the abdominal ring, through which the intestine has protruded, and the ring is widened. The bowel is reduced, returned to the abdomen, and the whole scrotum secured in clams and allowed to slough off ; when adhesions take place and the intestine is prevented from coming out again through the abdominal ring.

Ventral Hernia.—Sometimes the bowel protrudes into the skin through a rupture of the muscles of the abdomen ; if slight, this is not attended with much danger, or inconvenience to the animal ; therefore, treatment is unnecessary.

Gut-tie.—In castrated animals the bowel sometimes protrudes into the pelvis, this is caused by strain.

ing or by climbing hills. There are colicky symptoms present, and great arching of the back. The animal presses the hind quarters against hard objects such as a wall or fence. There is much straining and the dung is scanty.

Treatment.—The animal is often relieved by making it jump to a low level, or rolling it on its back, otherwise the reduction of the bowels should be tried by manipulation per rectum.

Foul in the Foot.—Is the formation of abscesses in the foot and is due to the accumulation of dirt, over-growth of the hoof, injuries, and sometimes to scrofula. The digits are separated from each other, there is much inflammation between them, and abscesses form and pus runs under the horny structures, the animal goes very lame, there is much pain, fever, and wasting.

Treatment.—Cleaning of the foot and the removal of all diseased horn and foreign matter, a clean stall, poulticing, mild astringents, as alum lotion, and dressing with carbolic oil are beneficial. Internally a purgative dose, and nitre in the drinking water, should be administered.

Mange is a skin disease resembling itch, it is caused by a certain parasite and is generally seen in neglected animals. When an animal gets it, he is liable to convey it to others. There is great itchiness and the animal rubs his body against hard objects, the hair fall off from the parts affected and scabs and pimples are seen.

Treatment.—Cleanliness is of great importance in treating this malady, the skin should be cleaned with soap and tepid water and washed, preferably, with a solution of corrosive sublimate. An ointment com-

posed of sulphur and lard (one to eight) should be rubbed in, and repeated for some days. Internally, a purgative should be administered.

Warbles or pouches appear on the back of animals, often close to the tail through the gad-fly depositing its eggs under the skin. When the eggs mature the warbles burst and the grub falls. When discovered the grub may be removed by pressure and the part dressed with carbolic ointment.

Ophthalmia or inflammation of the eye. It is caused by mechanical injuries and the lodgment of foreign bodies, also as a result of ill-ventilated stables. The eyes become inflamed and red, there is discharge of tears, the eyelids are closed, and intolerance of light.

Treatment.—The eye should be carefully examined and any foreign bodies removed. Fomentations, especially with a decoction of neem or tamarind leaves, and the application of a cooling lotion such as lead acetate, a dram to a pint, is useful. If the disease has progressed and there is ulceration, a solution of silver nitrate, (five grains to an ounce) may be used, or a solution (five grains to an ounce) of zinc sulphate. Belladonna is also a good remedy in diseases of the eye.

CHAPTER XX.

CATTLE POISONING.

Cattle suffer more frequently from the effects of poisonous substances than is usually supposed.

The deaths under this head are brought about in three ways, *viz.* : Accidental, Criminal, Empirical.

Accidental poisoning occurs in a variety of ways. Hungry cattle are often turned into bare pastures where they browse upon acrid and poisonous herbage, or plants unfitted as food. Fodder affected with fungoid diseases such as "rust," "mould" and "mildew" also brings on poisoning.

The most common poisonous plants accidentally taken with the food are :—

- (1) Dhatura, Thorn apple (*Datura Stramonium*.)
- (2) Mudar, Gigantic Swallow-wort. (*Calotropis Gigantea*.)
- (3) Tobacco (*Nicotiana Tabacum*.)

Criminal poisoning. The nefarious practice of cattle poisoning is common in many parts of India. It is carried on by the lowest order of natives, and the loss of cattle annually from this cause is considerable. It must be remembered that the hides and the carcases of the dead cattle of a village are the perquisites of the pariahs. During the season when hides sell very dear, they are no doubt tempted to poison the village cattle.

There is often an agreement for supplying a definite number of hides within a given time, between the pariahs and the chucklers on one side, and the hide merchants on the other.

The poisons generally employed by these malefactors are either vegetable or mineral. The vegetable poisons are :—

- (1) Dhatura, Thorn apple (*Datura Stramonium.*)
- (2) Mudar or Gigantic Swallow-wort (*Calotropis Gigantea.*)
- (3) Nux Vomica (*Strychnos Nux Vomica.*)
- (4) Angular leaved physic nut (*Jatropha Purgans.*)
- (5) Abrus (*Abrus Precatorius.*)

The mineral poisons are :—

- (1) Arsenic, white.
- (2) Arsenic, yellow.

There are several modes of poisoning : one plan they adopt is to mix the dose of poison with a little flour or bran, wrap it up in a plantain or other leaf, and put it into the mouth of the bullock or throw it on the ground in front of the animal while feeding, so that he may pick it up and eat it ; at other times the substance is simply mixed with the animal's grass. Sometimes the poison is scattered over a sweet bit of pasturage ; this is done particularly with mineral poisons. The third plan is to introduce the poison with a sharp instrument through the skin into any part of the body, or into the fundament or vagina.

There is said to be rather a curious method of poisoning practised in some parts of India. The head of an animal dead from cow-pox, or some other contagious disease, is buried until it putrifies ; a needle or sharp piece of bamboo, is then poisoned by insertion into it. This is said to be used in causing disease in the healthy by making a puncture in the skin, and thus inoculating them.

The acrid milky juice of the Mudar plant (*Calotropis Gigantea*) is drawn in a cocoanut shell, and a piece of rag about a cubit in length, and an inch in

breadth, is dipped in the juice until the point of saturation is reached. Then the cloth is wrapped around a piece of stick about a foot long, and $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in diameter, this is introduced into the rectum of animals and turned in the direction contrary to that in which the cloth was wrapped on. The turning is continued until the cloth leaves the stick, and drops into the intestinal canal. As Mudar juice is one of the most acrid poisons, a severe attack of inflammation of the bowels sets in, and the animal sinks in a very short time, after suffering great agony.

Another substance used by the professional cattle poisoner is the powdered seed of *abrus precatorius*, which he introduces under the skin of the animal, this seed, though harmless when swallowed, acts as a virulent poison when introduced under the skin, killing the animal in a very short time.

Cattle poisoning is largely practised in villages where diseases of a contagious and highly fatal nature exist, for there the cattle owners do not suspect the pariahs as the miscreants, and thereby the detection of the crime is rendered difficult, and the culprits go unscathed. Sometimes these evil-doers go even so far as to sow the germs of some of the most fatal of diseases, as Rinderpest, and Anthrax, broadcast by removing the garbage of the plague-stricken animals to different villages, where they scatter it over sweet bits of pasturage.

If a poisoned animal is seen in time, something might often be done to alleviate his sufferings, or to cure him completely, thus, for instance, an animal which suffers from delirium through taking Dhatura, accidentally or otherwise, should be given large quantities of fluid congee with a lot of salt dissolved in it, also milk or whey if procurable should be adminis-

tered. Small quantities of arrack, handrubbing, and exercise would relieve the animal much. When poisoned by Tobacco the same treatment as the above may be followed. The animal will be seen to be drowsy, so he should be roused by the application of cold water to the head and body by smart blows from a wet towel. In poisoning by Mudar and Jatropha, large doses of milk, eggs, congee, and linseed oil may be given with advantage. Nux Vomica poisoning brings on tetanic symptoms; purgatives and large doses of Indian hemp often prove useful. When poisoned by arsenic, the animal shows severe abdominal pains; he must be given large quantities of tepid water, gruel, &c. Iron rust dissolved in water or, much better, a mixture sulphate of Iron and Ammonia, should be given. Charcoal also proves to be of use.

Empirical practice.—In empirical practice, cowmen, shepherds, and even farmers, make use of remedies of the action of which they are in total ignorance, and death results from conditions that are not only misunderstood, but more frequently unobserved until too late. The mortality among affected animals is rendered greater by the employment of illiterate men in the treatment of the diseases of cattle.

CHAPTER XXI.

MEAT AND MILK.

Meat.—It must now be accepted as a fact that beef and mutton are largely consumed in India, so we must hastily see how such food can best be obtained, and prepared, without danger to the health of those who slaughter and feed on it. In all slaughter-houses it is necessary that things should be kept clean and the surroundings healthy; thorough disinfection ought to be carried out, and the refuse removed to a distance. The animals for slaughter must neither be too young nor too old ; they must be free from disease ; not pregnant ; nor in too poor a condition. The flesh of old or weak animals is very innutritious and may be considered not worth eating, and to slaughter sheep or cattle in this state is cruelty. Again, to destroy a mother carrying young is a wanton and reckless waste of life which cannot be too strongly spoken against ; indeed it is doubtful whether the flesh of such an animal is good for food.

The flesh of immature young animals is not nutritious, and the practice of eating them is very wasteful, although Europeans are very fond of the flesh of young oxen and sheep.

With regard to disease :—

- (1.) Any animal suffering from an inflammatory disorder of a severe character is unfit for food, although we have no evidence that his flesh may cause disease in man.
- (2.) Old disease, of which the active stage has passed, does not render a carcase unfit for food, but all parts actually altered from their healthy appearance should be destroyed.
- (3.) When disease has led to extreme weakness, the meat being almost white and the body in general sodden with yellow, or greenish yellow, watery fluid, the meat may cause serious diarrhoea and even symptoms resembling those of typhoid fever.

- (4.) The flesh of animals poisoned, or suspected of being poisoned, should not be used as human food.
- (5.) No decomposed, or blood-stained meat should be eaten. The carcases of animals killed by lightning decompose very rapidly and, therefore, should not be eaten.
- (6.) In this country, where meat is plentiful and cheap, no animal suffering from communicable disease should be destroyed for use as food.
- (7.) Parasites are one of the principal dangers from eating meat. The common parasites are :—
 - (a.) Tape-worm from eating mearly beef or pork.
 - (b.) Trichinosis (a disease often fatal and always very painful) from eating pork.

Mutton is in this respect the safest meat for consumption in India. Although it is by no means rare to find cysts, or bladders of the tape-worm, adherent to the liver of the sheep, these bladders are easy of detection, and besides the process of cooking kills them.

Anthrax and Tuberculosis, are probably conveyed to man when animals which die from them are used as food. It is very important to remember this, because, in most parts of the country, low caste men are glad to get hold of any meat and eat even the most filthy flesh with great readiness.

Milk.—Milk is so generally used as food, that it deserves our careful attention. In this country we get very poor milk often because the animals are not properly fed. The milkmen frequently mix large quantities of water in the milk they sell, sometimes they add flour, cocoanut milk, and such other stuffs. There are perhaps no absolute dangers attendant upon these practices, but the water used is not always from good healthy sources, and may be contaminated with typhoid matter. Thus probably cases of typhoid fever, such as have been traced to the milk, are brought about; for we have

no proof that any particular disease of cattle can produce typhoid in man. On the other hand, milk may be the actual cause of serious disease in man such as tuberculosis, and thrush, especially in children. Thus it is of great importance to reject milk obtained from cows suffering from either tuberculosis or foot and mouth disease, and when this article is obtained from unknown sources, *especially during the prevalence of epizootics, all milk ought to be thoroughly well strained through a fine cloth, boiled, and again strained before being used.*

Diseases which weaken the animal, either lessen the quantity, or seriously interfere with the quality of the milk, which then contains little butter, and only a very small quantity of sugar and flesh-forming materials. Good healthy milk is the best possible of foods, because it contains all the constituents required in proper proportions. Milk undergoes changes after it is drawn, by which it is rendered apt to take up metal from brass pots in which it is kept, and thus cause death or disease by poisoning ; it is a most dangerous practice, therefore, to leave milk in brass pots to stand for any time. Another very dangerous practice is that of keeping milk in open vessels standing in godowns or sheds which are in an insanitary condition, and where filth from men and animals has been allowed to accumulate. Often at one end of the house stand cattle up to their knees and hocks in manure, at the other we see the milkman's family, the place is thus thoroughly impregnated with the vapours from cattle and human beings, which must contaminate the milk, and make it a prolific cause of disease. Milk should not be drawn from sick animals, neither should it be mixed with water, nor kept exposed to dirt and diseased matter. It should be used before it undergoes changes and its value as food lessened.

It is very evident that a law to regulate the supply of milk in our towns is urgently required, and until one has been passed, and enforced, every milk consumer must be very careful as to the source from whence his milk and butter are procured. The above remarks refer to milk from the goat as well as to that from the cow. Different kinds of milk differ much in nutritive value, but all are liable to contamination.

CHAPTER XXII.

CRUELTY TO ANIMALS.

There are a number of practices common in India which are often very cruel and cause unnecessary pain to helpless animals. Those who perform acts of cruelty to animals are liable to be punished by law. Cruelty is often caused through ignorance or a want of thought on the part of those dealing with animals, and sometimes through sheer brutality.

Some people are so ignorant that they do not see that animals suffer pain just as men do ; wounds and disease are to them quite as great calamities as to us. They have nerves as we have, and things which we dislike are generally cruel to them.

Others are very careless, and may be unwilling to cause pain to poor harmless brutes, who cannot take care of themselves, but entirely fail to enter into the feelings of their animals, until perhaps a heavy fine makes them more careful.

Hindus are gentle by nature and kind to their animals. However, the lower classes of natives actually inflict pain through their brutality.

The ox is a long-suffering, hard working animal, and so ought to be the object of our sympathy. The following are some of the most common forms of cruelty to these animals :—

Firing the skin with a hot iron is very painful. It is practised by natives to a terrible extent in the treatment of disease; it is also done to disfigure the skin so as to prevent chulkers from poisoning the animal. Sometimes firing is done to give a supposed ornamental appearance, and at other times in conformity with religious rites. This practice must be avoided as much as possible.

Ulcers of the feet between the claws, and other forms of painful injury, are often seen in animals at work. It is great cruelty to make such sufferers go long distances and must be prevented.

Swellings or ulcers of the neck caused by the yoke are often enormous and horrible to look at. When the poor animals are worked with these they bend themselves up in all sorts of ways to try and get a little ease from pain. They are preventible, and curable, with very little trouble and expense.

Under-fed, or diseased animals, scarcely able to drag themselves along, are often compelled to draw or carry heavy weights, and because they manage to get through the work somehow, are supposed not to have been badly treated. How often do we see some poor wretched, half starved, undersized animal dragging along a heavy cart with a number of fat lazy men inside. Whoever rides behind an animal unfit to draw him, and makes his animal's carry too heavy loads, both the owner and the driver, ought to be fined.

An ordinary pair of bullocks should not be called upon to draw a heavier load of any kind in a cart than 1600 lbs, and this weight should never be exceeded.

Tumours are sometimes painless, but a tumour on the neck where the yoke rests undoubtedly causes an immense amount of pain.

Tail-twisting is cruel in the extreme, and is practised to a large extent as shewn by the knotted state of the tail of nearly every bullock one sees, the knots being the result of injury.

There are numbers of other common acts of cruelty, but those mentioned above will be sufficient to give some idea of what is meant by cruelty. As a rule, *any*

treatment which would cause pain in man will also cause pain in animals, and if the causing of pain is unnecessary, it is, no doubt, a cruelty. There are a number of things which are done for the benefit of animals themselves, which are painful, but not cruel ; thus blistering or dressing a wound is not cruel, so also the moderate use of a whip is not cruel. And the destruction of animals for food, if properly carried out, causes very little pain. It is our duty on all occasions to be kind to animals ; apart from the feelings of humanity, which leads us to cause as little pain as possible, there are many reasons why we should not be cruel. In the first place, we gain no benefit from it, but, on the contrary, lessen the power of our animals to do work ; it also prevents their fattening, and interferes with the production as well as the quality of milk. It lessens the pleasure we have in getting our work well done, and again, it is contrary to all religions. The Surgeon can even prevent pain inflicted in operations done in the treatment of disease, by the administration of chloroform and such other anaesthetics.

APPENDIX No. I.

MADRAS ACT NO. II OF 1886.

An Act for the prevention of the spread of disease among Cattle in the Madras Presidency.

WHEREAS it is expedient to take measures to prevent the spreading of contagious or infectious diseases among animals in the Presidency of Madras, and, with that object, to prescribe by law in what way animals so infected shall be dealt with, it is hereby enacted as follows :—

1. This Act shall be put in force in such Districts, or parts of Districts, and during such periods of time, as the Governor in Council may, from time to time, direct by Notification in the Fort Saint George Gazette.

Act to be extended to such places, and during such periods of time, as the Governor in Council thinks proper.

2. The following words and expressions in this Act shall have the meaning hereby assigned to them, unless there be something in the subject or context repugnant to such construction :—

The word "Magistrate" shall include all persons exercising all or any of the powers of a Magistrate.

Words importing the singular number shall include the plural number, and words importing the plural number shall include the singular number.

Words importing the masculine gender shall include the feminine.

The word "Animal" shall mean any Camel, Buffalo, Horse, Pony, Ass, Bull, Bullock, Cow, Heifer, Calf, Sheep, Lamb, Goat, Kid, or Swine.

3. Whenever this Act shall have been applied, as above provided, to any District, or part of a District, Hospital Pounds shall be established in such places as the Magistrate of District

Where Hospital Pounds shall be established.

shall determine, and Keepers shall be appointed to such Pounds by the said Magistrate. The village, or villages, by which every Hospital Pound is to be used, shall be determined and notified by the Magistrate.

4. Whenever, in any District, or part of a District to which
 Owner or person in charge of cattle to give notice when they are attacked by any contagious disease.
this Act has been extended as above provided, any animal is attacked by any contagious or infectious disease, it shall be the duty of the owner, or of the person in charge thereof, to give immediate notice to the Keeper of the Hospital Pound, provided for the village or township in which the animal may, at the time, be.

5. On receiving notice as aforesaid, the Keeper of the Hospital Pound shall, as soon as possible examine the animal, and shall decide whether it is necessary to place it in the Hospital Pound for treatment.
 Pound Keeper to examine animal.

6. If the Keeper of the Hospital Pound shall be of opinion that the animal has any contagious or infectious disease, he shall thereupon require the owner of the animal, or the person in charge thereof, to place it in the Hospital Pound, and, if necessary, shall require the owner, or the person in charge, to take such measures as he may direct, for disinfecting the shed or other place in which the said animal may have been kept.
 To direct removal to Hospital Pound if necessary.

7. Every Keeper of a Hospital Pound, or person thereto authorized by the Magistrate of the District, shall have power, within the range for which he is appointed, to enter upon and inspect any premises or place in which any animal or animals, which he suspects to be laboring under any contagious or infectious disease, may be found, and to examine and inspect, whenever or wherever he may deem it necessary, any animal or animals which he suspects to be laboring under such disease, and to require the removal of such animal or animals to the Hospital Pound for the range.
 Inspection of places in which any animal, suspected to be laboring under any contagious or infectious disease, may be found.

8. Every Keeper of a Hospital Pound, or person thereto

Cleansing of premises in which any animal, laboring under any contagious or infectious disease, has been or may be.

ing under any contagious or infectious disease, has been or may be, and to cause to be disinfected, and if necessary destroyed, any fodder, manure, or refuse matter which he may deem likely to propagate the said disease.

9. From the time when any animal affected as aforesaid

Expenses for food and treatment to be borne by Cattle Pound Fund, unless owner supplies fodder and medicines.

under Act III of 1857, unless the owner, or person in charge thereof, desires to supply the food and medicines himself provided always, that such food and medicines shall be such as the Keeper of the Hospital Pound may approve or direct.

10. The Keeper of the Hospital Pound, or other person

Animals destroyed to be buried, and no compensation claimable by owner.

ever it shall appear to him to be necessary to prevent the spread of contagion or infection. When any animal shall have been so destroyed, or shall die whilst in charge of the Keeper of the Hospital Pound, it shall be the duty of the said Keeper to have the carcase of the said animal buried at least six feet below the surface of the ground, and any cost incurred in so doing shall be met from the Cattle Pound Fund. No compensation shall be claimable in respect of any loss incurred by reason of any act authorized by this Section.

11. Should an animal impounded as aforesaid recover from

Fees to be charged, and animal to be sold to pay expenses if not paid. the disease under which it may have been laboring, the owner or person who was in charge thereof shall pay to the Keeper of the Hospital Pound, to be placed to the credit of the Cattle Pound Fund, the actual cost of the feeding and treatment of

such animal. Should he fail to pay the expenses aforesaid, then the said animal shall be sold by auction, and the sum realized by its sale, after deducting the amount of the expenses, shall be paid over to the owner, or the person who was in charge: provided always, that, in such cases as the owner or person who was in charge may elect to supply food and medicine, he shall not be required to pay any charges whatever.

12. No person having in his possession, or under his custody, any animal which has been in the same shed or stable, or in the same herd or flock, or in contact with any animal labouring under any contagious or infectious disease, shall remove such animal alive from his land or premises without the license of the Keeper of the

Prohibition against removal without license, from one place to another, of any animal which has been in the same shed, or in contact with any animal labouring under any contagious disease. Hospital Pound for the range, or of some person authorized by the Magistrate of the District to grant such license. Every such license shall be in writing, and shall only permit the removal of such animal to some place where it can be conveniently kept apart from all other animals until the Hospital Pound Keeper, or other person authorized as aforesaid, is satisfied that there is no reasonable probability of such animal propagating the disease.

13. If any person, who may be in charge of any animal

Ponalty for failing to give notice when animal is attacked by disease. at the time of its being attacked by a contagious or infectious disorder, shall fail to give notice to the Hospital Pound Keeper of the village, as required in

Section 4, the said person shall be liable, on conviction before a Magistrate, to a fine not exceeding Rupees five for every instance of such neglect, commutable, if not paid, to simple imprisonment for any period not exceeding ten days.

14. Any person who shall fail to comply with the directions

Ponalty for refusing to obey directions of Cattle Pound Keeper, &c. of a Hospital Pound Keeper, or of a person duly authorized by the Magistrate of the District in that behalf, as to the

impounding any diseased animal; or to the disinfecting any premises or place where any diseased animal may have been kept; or to the disinfecting or destroying any fodder, manure, and refuse matter which may be likely to propagate the disease; or who may remove, without a license, any animal which has been in the same shed or stable, or

in the same herd or flock, or in contact with any animal laboring under any contagious or infectious disease, shall, on conviction before a Magistrate, be liable, for every such offence, to a fine of twenty Rupees, commutable, if not paid, to simple imprisonment for any period not exceeding ten days.

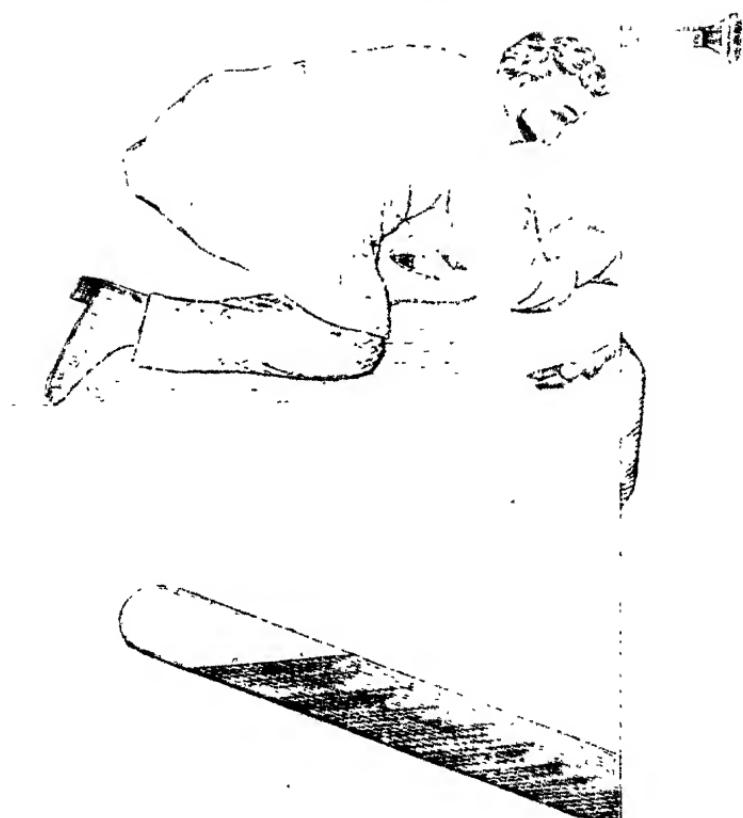
15. In any District or part of a District in which this Act is in force, it shall be the duty of all Hospital Pound Keepers, of all Police Officers not below the rank of a Head Constable, and of such other persons as the Magistrate of the District may especially empower to seize and impound all animals suffering from contagious or infectious disease, and any person who shall forcibly oppose such seizure, or who shall forcibly rescue the animals after such seizure, shall be deemed to have committed an offence punishable under Section 186, of the Indian Penal Code.

16. Any person, whose animals shall have been seized as being diseased may prefer a complaint against the seizure, at any time within ten days from the date thereof, to any Magistrate. The complaint may be either verbal, in which case the substance of it shall be taken down in writing by the Magistrate, or written upon plain paper, and shall be preferred by the complainant in person, or by an agent personally acquainted with the circumstances. If, on examination of the complainant or his agent, the Magistrate shall see reason to believe the complaint to be well founded, he shall summon the party complained against, and shall proceed to make a summary inquiry into the case. If the seizure be adjudged illegal, the Magistrate shall award to the complainant such damages as he may deem to be a reasonable compensation for any loss or injury sustained from the unlawful seizure, together with all expenses incurred by the complainant in procuring the release of the animals; or, if the animals have not been released, the Magistrate, in addition to the award of damages, shall make an order for their release, and shall direct that the expenses leviable under this Act shall be paid by the party who made the seizure. The amount of all damages and expenses so awarded shall be recoverable according to the process prescribed in Act No. V. of 1865 (Madras), for the recovery of forfeitures or penalties imposed under the authority of Act XXIV. of 1859.

17. All fines levied under this Act shall be credited to the Cattle Pound Fund established under the provisions of Act III of 1857, which Fund shall be available for payment of all expenses incurred under the provisions of this Act, provided that it shall be lawful for the Officer inflicting a fine under this Act to direct any portion thereof, not exceeding one-half, to be paid to the informer.

18. It shall be lawful for the Governor in Council, by notice published in the Fort Saint George Gazette, to make and prescribe such bye-laws, as may from time to time seem necessary, for the more effectually preventing the spreading of infectious or contagious diseases among animals, provided that such bye-laws shall not be repugnant to the provisions of this or any other Act. A breach of any such bye-laws shall render the party liable, on conviction before a Magistrate, to a fine not exceeding Rupees ten, commutable to simple imprisonment for fifteen days.

F.G. 4.



APPENDIX No. II.

PASTEUR'S METHOD OF PROTECTIVE INOCULATION FOR ANTHRAX.

1. The disease known under the names of "Charbon," Splenic Fever, Siberian Plague, Anthrax Fever, Splenic Apoplexy, Braxy, Gloss-Anthrax, Black Quarter, and Malignant sore throat, commonly called Loodianah Fever, is caused by the development of a microscopic organism (Bacterium) in the blood of the animal. If a few drops of the blood of an animal which has died of this disease, are introduced under the skin of a healthy one death is almost sure to follow in the course of two or three days. The bacteria which cause the disease are then in an exceedingly virulent condition, and if the virus were cultivated, that is, if it were developed in a solution favourable to its growth, it would retain its virulence. By adopting a plan which has been described at length, in the reports of the Academy of Sciences, Messrs. Pasteur, Chamberland, and Roux have succeeded in attenuating this virulence, and they have managed to obtain fresh virus of different degrees of strength. Thus they can produce a very powerful virus which would be sure to cause death, or virus more or less attenuated which would communicate the disease in a mild form, or virus which is entirely harmless and which would not impart the disease at all.

2. Now, when an animal has had the mild disease by introducing under the skin bacteria weakened in their virulence, it is not fit to contract the mortal disease, that is, that animal cannot die of anthrax, during a certain time, at least within about one year. Under this fact lies the principle of anthrax inoculations. In order to protect animals from contracting this disease which is certain to be fatal to many of them, two preservative inoculations are made ; the first with very weak virus (1st Vaccine matter or Anthracine) which gives only a slight fever; and the second used twelve or fifteen days later with much stronger virus (2nd Vaccine matter) which would kill a certain number if they were not already protected in part by the previous inoculation ; but in consequence of this partial protection, animals on the second inoculation get only a slight fever. When they are completely protected, they have become insusceptible to anthracoid diseases. Sheep, goats, cattle, buffaloes, yes, asses, mules, and many other animals can be so protected.

PRACTICE OF THE OPERATION.

1. The "vaccinal" liquid or lymph is conveyed to its destination in closely-corked tubes (fig. 1), which contain sufficient to inoculate 50, 100, 200, or 300 sheep and goats or 25, 50, 100, or 150 cattle, buffaloes or horses. These tubes are labelled "First vaccine" or "Second vaccine." A certain quantity of this liquid must be inserted under the skin of the animal. This can be done with a Pravaz syringe (fig. 2), such as is used by Doctors and Veterinary Surgeons to make injections under the skin of man and the domesticated animals. First, the syringe must be filled with the liquid. For this, the small metallic thread in the needle, which is intended to keep out any foreign substance that might choke it up, must be removed. The needle must then be fixed on the piston tube (cylinder), the vaccino shaken, and the liquid drawn up by slowly raising the piston (See fig. 3). If the syringe works well it will be completely filled with liquid and will leave only a very small air bubble under the piston. It frequently happens, however, that the piston is more or less dry, or that the needle does not fit well. Then the liquid does not fill the syringe completely, and a very large air bubble is found under the piston. In this case, by repeating the process two or three times, the piston will be moistened, and if the needle fits well the syringe will be filled completely. *It is indispensable that this first condition should be attained.*

2. If, however, owing to any accident, the piston should be too dry, and allow the air to escape, it should be boiled in water and left to cool in the vessel in which it was boiled until it is lukewarm, then the syringe must be filled two or three times with this water to swell the piston. *Water which has not been boiled must never be used for this purpose.*

3. If the water passes above the piston, it is a sign that it is bad and will have to be changed. If one piston only is at the disposal of the operator, it must be tightened a little with the small key which is in the box of the syringe.

4. *Sheep and Goats.*—When the syringe is quite full, the little brass marker which is on the stem of the piston must be placed at the division marked 1. An assistant must then take hold of the animal which is to be inoculated, and hold it firmly by its fore-legs in the required position (See fig. 4). The operator then must insert his needle under the skin in the middle of the *right* thigh, and push the piston until the marker

touches the syringe. The inoculation of the first animal is then complete. The syringe is drawn back, the brass marker is placed at the division marked "2" on the stem of the piston and the second animal is operated upon; and so on, each syringe holding enough to inoculate eight. When empty, the syringe must be filled up again in the same way as before. With a little practice, a man would soon be able to inoculate 150 sheep per hour. Twelve or fourteen days after the first operation, the process must be repeated with the second vaccine; but this time the injection must be made in the *left* thigh of the animal—that is, in the one which has not been already operated upon.

5. *Horses, &c.*—The same fluid which is used for sheep and goats, may be taken for cattle, horses, asses and mules; but a double dose will be needed for the larger animals—that is to say, the small brass marker must be placed at the division 2 for the first operation; afterwards it may be put at 4, and then at 6, etc., each syringe containing enough lymph to inoculate four of the larger, instead of eight of the smaller animals. Instead of injecting the lymph into the thigh, it should be put behind the shoulder for cattle, and in the neck of the horse, ass, and mule, care being taken to place it where the collar will not press upon the marks.

6. The skin of large animals is very difficult to pierce with a needle; care must be taken, therefore, to make the puncture in an exact line with the syringe, to avoid a bruise. It is a good plan also to make a small fold of skin with the left hand, by way of facilitating the introduction of the needle. The same needle which has been used for sheep should not be used for the larger animals, and for safety's sake, a stronger needle for operating on them is put into the box with the syringe.

7. It is most important that the vaccinal liquid should be in a condition of *perfect purity* when it is injected under the skin. If it be impure, that is to say, if it were contaminated by water which had not been boiled, or by dust, or other foreign substance,—there would be injected into the animal, not only the mild virus, but other organisms, possibly those of erysipelas or septicæmia (for example), which might give another disease, or the inoculation might be hindered. *The liquid as sent is quite pure*, and may be drawn directly into the tube, but it is necessary that the syringe also should be pure. New syringes which have never been used are so, but after they have been employed for one inoculation they should be replaced by fresh

ones. *The operation is an exceedingly delicate one*, and the syringe should be repaired and cleaned before it is used again. In one word, a syringe should not be used a second time after some days have elapsed since it was first employed, until it has been thoroughly cleansed.

8. *The lymph should be put as soon as possible in a cellar to keep it cool, and a tube which is open one day should not be employed on the following or succeeding days. Consequently, the contents of every tube which is opened should be used the same day, and any matter which remains should be rejected without hesitation.*

9. If an operator is pressed for time, or has too many animals to inoculate he may do his work in a hurry ; then there is a danger that the needle may pass over the skin instead of piercing it, and shoot the vaccine outside ; or he may neglect to remove the marker, and from that time he may push the piston but the lymph will not be injected under the skin. Under these circumstances, as there is a doubt about the first inoculation, there is a danger that since the first vaccine has not been introduced into the system, *the second vaccine, being more active, may cause death.*

10. Great care should be taken also to prevent animals which are being inoculated with the first vaccine, from escaping too soon out of the hands of the assistant who is holding them. They may mingle with the flock or herd, and then have an injection of the second vaccine, before they have been partially preserved by the first and in this way accidents may arise.

11. There is another mischance to be guarded against, namely, that the air in the tube must never be at the needle end. If it were so, the operator might push the piston, but air only, not lymph, would escape, and thus the inoculation would not be accomplished. *This accident is of frequent occurrence.*

12. Cattle and buffaloes have not hitherto exhibited a tumour at the points inoculated. Horses, especially young horses, have sometimes had tumours more or less extensive, but they always subside with tolerable quickness, without any treatment whatever. The experiment of inoculating young horses three times has been made, that is, twice with the first vaccine and once with the second, but not the slightest tumour has been produced. Proofs of this kind continue to increase. It may be that this is the best method of inoculation for these animals.

(True translation from the French with a few alterations.)

APPENDIX No. III.

WEIGHTS AND MEASURES.

The English weights and their appropriate Indian equivalents.

1 Grain	=	$\frac{1}{2}$ Gundumani (the seed of Abrus precatorius.)
„	=	$\frac{1}{4}$ Manjadi (the seed of Adananthera pavonia.)
1 Drachm	=	1 Pagoda = $\frac{1}{3}$ Rupee.
1 Ounce	=	$2\frac{1}{2}$ Rupees = 14 Pies.
1 Pound	=	$38\frac{1}{2}$ Rupees.

The Indian weights and their appropriate English equivalents.

1 Gundumani	=	2 Grains.
1 Manjadi	=	4 Grains.
1 Calanji	=	80 Grains.
1 Pagoda	=	1 Drachm.
1 Rupee (or Tolah)	=	3 Drachms.
1 Pollam	=	9 Drachms.

The English measures and their appropriate equivalents.

1 Minim	=	1 Drop.
1 Drachm	=	60 Drops.
1 Ounce	=	$\frac{1}{3}$ Ollock.
1 Pint	=	$2\frac{1}{2}$ Ollocks.
1 Gallon	=	$2\frac{3}{4}$ Madras measures.

The Indian measures and their appropriate English equivalents.

1 Ollock = 8 Ounces.

1 Madras measure = 3 Pints.

Indian weights and measures.—(Steel.)

(Bengali)—1 Tolah = nearly 3 drachms = 11.7

Grammes = 1 Rupee weight.

1 Chitk. = 5 tolahs = nearly 2 ounces = 58.3

Grammes = 5 Rs. weight.

1 Poah. = 4 Chitk. = 20 tolahs = nearly 8 $\frac{3}{4}$ ounces
= 233.25 Grammes = 20 Rs. weight.

1 Seer = 4 Poah. = 16 Chitk. = 80 tolahs = nearly
2 lbs. 1 oz. = 933 Grammes = 80 Rs. weight.

1 Pullah (Tel) = 126 Seers. = 504 Poah. = 2016
1 Pullum { Chitk. = 10080 tolahs, nearly 280 lbs.
(20 stone).

1 Maund = 40 Seers = 160 Poah. = 640 Chitk. =
3200 tolahs nearly 42 lbs.

The marks or signs of Apothecary weights and measures.

WEIGHTS.

Pound.	Ounce.	Drachm.	Scruple.	Grain.
lb.	ʒ	ʒ	ʒ	gr.

MEASURES.

Gallon.	Pint.	Ounce.	Drachm.	Minim.
C. or Congius.	O. or Octarii.	ʒ	ʒ	m

APPENDIX No. IV.

ACT No. XI OF 1890.

PASSED BY THE GOVERNOR-GENERAL OF INDIA IN COUNCIL.

(Received the assent of the Governor-General on the
21st March, 1890.)

—*—

An Act for the Prevention of Cruelty to Animals.

Whereas it is expedient to make further provision for the prevention of cruelty to animals; it is hereby enacted as follows:—

1. (1) This Act may be called the Prevention of Cruelty to Animals Act, 1890.

(2) This section extends to the whole of British India: and the Local Government may, by notification in the official Gazette, extend, on and from a date to be specified in the notification, the whole or any part of the rest of this Act to any such local area as it thinks fit.

Title, extent
& commence-
ment and sup-
pression of
other enact-
ments.

(3) When any part of this Act has been extended under sub-section (2) to a local area, the Local Government may, by notification in the official Gazette, direct that the whole or any part of any other enactment in force in the local area for the prevention of cruelty to animals shall, except as regards anything done or any offence committed or any fine or penalty incurred or any proceedings commenced, cease to have effect in the local area, and such whole or part shall cease to have effect accordingly until the Local Government, by a like notification, otherwise directs.

(4) The Local Government may cancel or vary a notification under sub-section (2) or sub-section (3).

2. In this Act, unless there is something repugnant in the Definitions, subject or context,—

(1) “animal” means any domestic or captured animal: and

(2) "street" includes any way, road, lane, square, court, alley, passage or open space, whether a thoroughfare or not, to which the public have access.

Penalty for cruelty to animals in public places and for sale in such places of animals killed with unnecessary cruelty.

3. If any person in any street or in any other place, whether open or closed, to which the public have access, or within sight of any person in any street or in any such other place,—

- (a) cruelly and unnecessarily beats, over-drives, over-loads or otherwise ill-treats any animal, or
- (b) binds or carries any animal in such a manner or position as to subject the animal to unnecessary pain or suffering, or
- (c) offers, exposes, or has in his possession for sale any live animal which is suffering pain by reason of mutilation, starvation or other ill-treatment, or any dead animal which he has reason to believe to have been killed in an unnecessarily cruel manner,

he shall be punished with fine which may extend to one hundred rupees, or with imprisonment for a term which may extend to three months, or with both.

Penalty for practising phuka.

4. If any person performs upon any cow the operation called phuka, he shall be punished with fine which may extend to one hundred rupees, or with imprisonment which may extend to three months, or with both.

Penalty for killing animals with unnecessary cruelty anywhere.

5. If any person kills any animal in an unnecessarily cruel manner, he shall be punished with fine which may extend to two hundred rupees, or with imprisonment for a term which may extend to six months, or with both.

Penalty for employing anywhere animals unfit for labour.

6. (1) If any person employs in any work or labour any animal which by reason of any disease, infirmity, wound, sore or other cause is unfit to be so employed, or permits any such unfit animal in his possession or under his control to be so employed, he shall be punished with fine which may extend to one hundred rupees.

(2) The Local Government may, by general or special order, appoint places to be infirmaries for the treatment and care of animals in respect of which offences against sub-section (1) have been committed.

(3) The Magistrate before whom a prosecution for such an offence has been instituted may direct that the animal in respect of which the offence is alleged or proved to have been committed shall be sent for treatment and care to an infirmary and be there detained until it is in his opinion, or in the opinion of some other Magistrate, again fit for the work or labour on which it has been ordinarily employed.

(4) The cost of the treatment, feeding and watering of the animal in the infirmary shall be payable by the owner of the animal according to such scale of rates as the District Magistrate or, in the case of an infirmary in a Presidency-town, the Commissioner of Police may from time to time prescribe.

(5) If the owner refuses or neglects to pay such cost and to remove the animal within such time as a Magistrate may prescribe, the Magistrate may direct that the animal be sold and that the proceeds of the sale be applied to the payment of such cost.

(6) The surplus, if any, of the proceeds of the sale shall, on application made by the owner within two months after the date of the sale, be paid to him, but the owner shall not be liable to make any payment in excess of the proceeds of the sale.

7. If any person wilfully permits any animal of which he is the owner to go at large in any street while the animal is affected with contagious or infectious disease, or without reasonable excuse permits any diseased or disabled animal of which he is the owner to die in any street, he shall be punished with fine which may extend to one hundred rupees.

Penalty for
permitting di-
seased animals
to go at large
or to die in
public places.

8. (1) If a Magistrate of the first class, Subdivisional Magistrate, Commissioner of Police or District Superintendent of Police, upon information in writing and after such inquiry as he thinks necessary, has reason to believe that an offence against section 4, section 5 or section 6 is being or is about to be or has been committed in any place, he may either himself enter and search or by his warrant authorise any police-officer above the rank of a constable to enter and search the place.

Search-war-
rants.

(2) The provisions of the Code of Criminal Procedure, 1882, relating to searches under that Code shall, so far as those provisions can be made applicable, apply to a search under sub-section (1).

X of 1882.

Limitation for prosecutions.

9. A prosecution for an offence against this Act shall not be instituted after the expiration of three months from the date of the commission of the offence.

Destruction of suffering animals.

10. When any Magistrate, Commissioner of Police or District Superintendent of Police has reason to believe that an offence against this Act has been committed in respect of any animal, he may direct the immediate destruction of the animal if in his opinion its sufferings are such as to render such a direction proper.

Saving with respect to religious rites and usages.

11. Nothing in this Act shall render it an offence to kill any animal in a manner required by the religion or religious rites and usages of any race, sect, tribe or class.

Provision supplementary to section 1 with respect to extent of Act.

12. Notwithstanding anything in section 1, sections 9, 10 and 11 shall extend to every local area in which any section of this Act constituting an offence is for the time being in force.

APPENDIX No. V.

Table of Dentition of Cattle.

Teeth.	Temporary.	Permanent.
<i>Incisors:—</i>		
Central	{ Before or a few days	$1\frac{1}{2}$ years.
Lateral	{ after birth	$2\frac{1}{2}$ do.
Outer lateral ...	14 days	$3\frac{1}{2}$ do.
Corner ...	2 to 3 weeks	$4\frac{1}{2}$ do.
<i>Molars:—</i>		
1st	{ Before or a few days	$1\frac{1}{2}$ years.
2nd	{ after birth	$2\frac{1}{2}$ do.
3rd		$3\frac{1}{2}$ do.
4th	6 to 9 months.
5th $2\frac{1}{2}$ years.
6th 4 to 5 years.

(Gamgee).

GLOSSARY

A.

Abort.—To bring forth young prematurely, to miscarry, slip or slink.

Abscess.—An accumulation or gathering of matter in any part of the body.

Absorbent.—Any substance which absorbs and neutralizes acid fluid in the stomach and bowels.

Actinomycosis.—Is a malignant growth found chiefly on the tongue and jaw bones of cattle, caused by a vegetable parasite.

Acute.—Attended with symptoms of some degree of severity, and coming speedily to a crisis.

Alteratives—Medicines which alter or improve the condition of the body.

Amputation.—The operation of cutting off a limb or projecting part of the body.

Anthrax.—Is a specific febrile disease, due to the presence in the system of a special micro-organism, the *Bacillus Anthracis*.

Antiperiodic.—A remedy possessing the property of preventing the return of periodic attacks of disease.

Antiseptic.—A substance which prevents putrefaction or retards it.

Aorta.—The great artery which carries the blood from the heart to all parts of the body except the lungs.

Aperient.—A medicine which gently opens the bowels.

Apoplexy.—Sudden diminution or loss of consciousness, sensation, and voluntary motion, usually caused by pressure on the brain.

Aromatic.—A drug or medicine characterized by a fragrant smell, and usually by a warm pungent taste.

Astringent.—A medicine which binds and strengthens a part.

Auricles.—The upper chambers of the heart by which the blood is received.

B.

Bandage.—A strip of woven material used in dressing and binding up wounds, &c.

Blister.—An agent which, when applied to the skin, produces a vesicle or a blister.

Bowels.—The internal parts of an animal, or the long tube or canal which runs from the stomach to the anus.

Brain.—The whitish soft mass in the skull, the organ of intellect.

Bratties.—Dung cakes.

Breeding.—The improving of any kind of domestic animals.

Bronchial tubes.—The air tubes of the lungs.

C.

Calculus.—A kind of stone formed in any part of the body, but most frequent in the organs that act as reservoirs, and in the passages connected with them.

Cancer.—A malignant growth of a part.

Capillaries.—Minute hair-like blood vessels.

Carbuncle.—A hard painful swelling generally accompanied by constitutional symptoms.

Carcase.—The dead body of an animal.

Carminative.—A medicine or substance which tends to expel wind from the stomach and bowels or to relieve colic, griping and flatulence.

Castration.—Depriving an animal of its testicles, gelding.

Cathartics.—Medicines that act on the bowels, and bring on purging.

Caustic.—A medicine which, when applied to a part, burns or destroys it.

Cauterize.—To fire, to brand.

Chew the cud.—To chew or masticate the food over again, as a cow.

Chyle.—The essence of digested food.

Cinerator.—A place where anything is reduced to ashes by combustion.

Colic.—Pain in the stomach or bowels.

Coma.—A state of profound insensibility from which it is difficult or impossible to rouse an animal.

Communicable.—Having the power of passing from one animal to another.

Constipation.—Binding of the bowels, or a state in which they are not active, and thus render the dung or faeces hard.

Contagious.—Spreading from one to another, communicable by contact.

Contaminated.—Defiled, tainted, polluted.

Convalescent.—Recovering from sickness or debility.

Costiveness.—Constipation, an unnatural retention of faecal matter in the bowels.

Counter-irritants.—Medicines which, when applied to the skin, produce artificial irritation or even inflammation and thus relieve pain and inflammation of the internal parts.

Cranial.—Belouging or pertaining to the skull.

Cremation.—The practice of burning the dead.

Cud.—The food deposited in the rumen, or the first stomach of an animal for rumination or re-chewing.

D

Decoction.—A watery solution got from a drug by boiling it in water.

Deleterious.—Noxious, hurtful, destructive.

Delirium.—A wandering of the mind.

Diabetes.—A disease in which there is profuse staling or passing of urine.

Diaphoretics.—Medicines which increase the quantity of sweat, the secretion of the skin.

Diaphragm.—A muscular partition dividing the cavity of the chest from the abdomen.

Diarrhoea.—A frequent evacuation of the bowels.

Disinfect.—To purify from contagious matter.

Disinfectants.—Medicines which act by destroying various ferments and organisms.

Dislocation.—The displacement of a bone out of its joint.

Diuretics.—Medicines which act on the kidneys and increase the flow of urine.

Dose.—The quantity of medicine given, or prescribed to be taken, at one time.

Draught.—Used for drawing, as a draught bullock.

Dropsy.—An unnatural collection of watery fluid in any part of the body.

Drug.—Any animal, vegetable, or mineral substance used in the composition of medicines.

Dysentery.—Purging in which the stools consist chiefly of blood and mucus.

E

Eliminatives.—Medicines which increase the various secretions of the body.

Embryotomy.—The cutting of a *foetus* into pieces within the womb, so as to effect its removal.

Ensilage.—The process of preserving fodder (such as corn-stalks, rye, oats, millet, &c.) by compressing it while green and fresh in a pit or vat called a silo, where it is kept covered from the air.

Epizootic.—A disease attacking many animals at one and the same time.

Expectorants.—Medicines which increase the secretion of the bronchial tubes, *trachea* and *larynx*.

F.

Faeces.—The excrement or contents of the bowels.

Fester.—To generate pus.

Flatulence.—A state in which flatus or gas is generated in the *alimentary canal*.

Fodder.—Dry food for horses and cattle as straw, hay, &c.

Fœtus.—The young animal in the womb.

Follicle.—A simple *gland* or cavity.

Forage.—Food of any kind for horses and cattle.

Fracture.—Breaking of a bone either wholly or partially.

Fundament.—Anus.

Fungus.—An order of plants belonging to the *mushroom* family.

G.

Gastric juice.—A thin watery acid juice or fluid secreted by the stomach.

Gear.—The harness of horses or cattle, trappings.

Gonorrhœa.—A contagious inflammatory disease affecting especially the urethra and vagina.

Griping.—Spasmodic pain in the intestines.

H.

Hæmatinics or Hæmetics.—Medicines which act on the blood either by supplying nutrition to it or by restoring some deficient ingredient in it.

Hamlet.—A little home or dwelling place; a small village.

Hay.—Grass cut and cured for fodder.

Hernia.—A protrusion of a bowel through a natural opening.

Husbandry.—Farming, tillage.

I.

Impaction.—A lodgment of anything, in the stomach or intestines.

Indigestion.—Want of due digestion, dyspepsia.

Infection.—Communication of disease from one animal to another, through the medium of the atmosphere.

Inflammation.—A diseased condition of any part of the body attended with heat, redness, pain and swelling.

Inoculation.—The act or practice of communicating a disease, to an animal in health, by inserting contagious matter in its skin or flesh.

Intestines.—See bowels.

Inundation.—An overflow or flood of water.

L.

Lacteal.—Pertaining to milk, conveying *chyle*.

Latent.—Concealed, hidden, unobserved.

Laxative.—A medicine which gently opens the bowels, and renders the dung soft.

Legume.—A pod splitting into two pieces like the pea.

Leucorrhœa.—A discharge of white sticky mucus resulting from inflammation or irritation of the lining of the genital organs of the female.

Lithotomy.—The operation of cutting for removing stone from the bladder.

Lop.—Cut off, separate.

Lotion.—A medicinal wash.

Lump jaw.—Tumours on the jaw due to actinomycosis.

Lungs.—The organs of breathing found in the chest of an animal.

Lymphatics.—Absorbent vessels carrying lymph.

M.

Maggots.—Small worms found in putrid sores.

Malaria.—A diseased condition produced by exhalations from decaying vegetable matter in contact with moisture, giving rise to fever and many other symptoms shown by their tendency to recur at definite and usually uniform intervals.

Malt.—Barley steeped in water, made to germinate, and dried.

Mamme.—The glands for secreting milk.

Mammitis.—Inflammation of the udder.

Mange.—A disease of the skin caused by the presence of parasites or small living creatures.

Manger.—A trough or open box in which fodder is placed for horses and cattle to eat.

Measle.—A disease of cattle and swine in the flesh of which we find "bladder-worms" belonging to the tape-worm family.

Membrane.—A thin layer or skin serving to cover some part of an animal or of a plant.

Metritis.—Inflammation of the womb.

Milch.—Giving milk.

Mildew.—A disease in plants.

Mouldy.—Overgrown with fungoid growth.

N.

Narcotics.—Medicines which relieve pain and produce sleep or stupor.

Nausea.—Any sickness of the stomach accompanied with a propensity to vomit.

Neurotics.—Medicines which act on the nervous system.

Nutrient.—Any substance which nourishes or promotes growth.

O.

Ointment.—A thick greasy substance used externally.

Ophthalmia.—Inflammation of the eye.

Orchitis.—Inflammation of the testicles.

Ovary.—The essential female reproductive organ in which the ova are produced.

P.

Parasite.—An animal which lives during the whole or part of its existence on or in the body of another animal, feeding on its food, blood and tissues.

Parturition.—The act of bringing forth the young ; delivery.

Perineum.—The space or line between the anus and scrotum in the male.

Piethora.—Excess of blood in the body.

Pleuro-pneumonia.—An inflammatory disease of the lungs and their covering.

Polyuria.—See Diabetes.

Poultice.—An application of a pulpy consistency applied externally.

Pound.—An enclosure erected by authority in which cattle are confined when found trespassing.

Predisposition.—Susceptibility.

Prostration.—Great oppression of natural strength and vigour.

Purgatives.—Medicines which produce frequent evacuations from the intestines.

R.

Rank.—Musty, gross, coarse, wild.

Rearing.—Bringing up young ones to maturity.

Rectum.—The end or terminal portion of the intestines.

Refrigerants.—Medicines or cold applications which contract tissues and give tone to them.

Repressed.—Checked, crushed, quelled.

Restoratives.—Medicines which restore some ingredients to the blood.

Rot.—A fatal disease which attacks sheep and sometimes other animals. It is due to the presence of a parasitic worm in the liver or gall-bladder.

S.

Saliva.—The frothy fluid which gathers in the mouth and is commonly known as spittle.

Scour.—Diarrhoea of calves.

Scrofula.—A constitutional disease manifested by chronic enlargement and cheesy degeneration of the lymphatic glands.

Scrotum.—The bag or pouch which contains the testicles.

Sedatives.—Medicines which depress the nervous system without previously exalting it.

Segregate.—To separate from others, to set apart.

Semen.—The fecundating fluid of male animals; sperm.

Sialagogues.—Medicines which increase the secretion of saliva.

Silo.—A pit or vat for packing away green fodder.

Skeleton.—The bones of the body preserved in their natural situation.

Slinker.—A cow which miscarries or slips her calf.

Spermatozoa.—The male germ cells in animals.

Spinal cord.—The great nervous cord extending backwards from the brain of vertebrate animals.

Splint.—A thin piece of wood, or other substance, used to keep in place, or protect, an injured part, especially a broken bone when set.

Sprain.—Strain of any soft structure.

Sterility.—The condition in which an animal is incapable of bringing forth young ones; barrenness.

Stimulants.—Medicines which rapidly but transiently excite the nervous system to increased activity and, as a consequence, induce a more energetic performance of the functions of the whole body.

Stock.—The domestic animals belonging to the owner of a farm ; also other property on a farm.

Stomachic.—A medicine which gives an agreeable and warm feeling to the stomach.

Straw.—Litter, the stalk or stem of certain species of grain as wheat, oats, &c.

Strip.—To milk dry ; to draw the last milk from a cow.

Stubble.—The stumps of wheat, rye, barley, oats, &c.

Stud.—A collection of breeding bulls and cows or the place where they are kept.

Styptics.—Medicines which stop bleeding.

Suppuration.—The formation of matter.

T

Teats.—The nipples of the breast.

Thrush.—An ulcerous disease of the mouth and throat.

Tincture.—A solution of a medicinal substance (commonly colored) in alcohol.

Tonic.—A medicine or agent which imparts vigour and strength to the body.

Tope.—A grove or clump of trees.

Tractability.—Docility.

Trichinosis.—A disease arising from eating pork affected with certain parasites.

Triturate.—To rub, grind, bruise or thrash.

Truck.—A Railway carriage for carrying cattle, &c.

Truss.—A bandage or apparatus to keep up the reduced parts and hinder further protrusion.

Tuberculosis.—Consumption.

Tumour.—A swelling or enlargement in any part of the body.

Twitching.—A muscular spasm.

Typhoid.—A continued fever accompanied by the discharge of watery faeces, frequently tinged with blood.

U.

Ulcer.—A corroding sore from which there is a discharge of matter, and generally caused by some constitutional disease.

Udder.—The milk bag of an animal.

Unthrifty.—Hide bound.

Urethra.—The canal by which the urine is conducted from the bladder and discharged.

Uterus.—The womb; that part of a female where the young of an animal is conceived and nourished till ~~it~~ birth.

V.

Veins.—Vessels of the body which convey the blood back to the heart.

Ventricles.—The two inferior chambers of the heart which receive the blood from the auricles and force it out from the heart.

Vermifuge.—A medicine that expels worms from the animal body.

W.

Warbles.—Small tumours produced by the larvæ of the gad fly.

Weevil.—An insect of the species of snout beetle, which is very injurious to cultivated plants.

INDEX.

A	PAGE.	PAGE.	
Abnormal Presentations	101	Castration, early	...
Abomasum	...	Catarrh	...
Abortion	100	Catechu	...
Abrys	116-117	Cathartics	...
Abscess	109	Cattle, selection of	...
Aconite	63	Cereals	...
Aden Cattle	13	Chalk	...
Age	15	Charcoal	...
Ajowan	64	Chick pea	...
Alcohol	64	Chiretta	...
Alternatives	62	Choking	...
Alum	63	Cinnamon	...
Ammonia Solution	69	Cinchona	...
Amrut Mahal Cattle	12	Cinerator	...
Anæmia	83	Cinerator, rules for use of	...
Animals, draught	12, 17	Cleanliness	...
Animal products, medicinal	71	Clyster	...
Aniseed	64	Cocoanut	...
Anthrax	72, 73	Colic	...
Aphtha	88	Communicable diseases	...
Apoplexy	81	Conje	...
Arsenic	69	Contagion	...
Arsenic, white and yellow	116	Copper sulphate	...
Assafetida	64	Coriander	...
Astringents	63	Corrosive sublimate	...
		Cotton seeds	...
		Counter-irritants	...
		Cow-pox	...
		Criminal poisoning	...
		Croton oil	...
		Cud, chewing the	...
		Cystitis	...
B	PAGE.	D	
Bael fruit	64	Dan	...
Bajri	26	Deccan Cattle	...
Barley	27	Dhall	...
Bhang	61	Dhall Kesheri	...
Birth	22	Datura	...
Bladder	45	Diabetes	...
Blood	41	Diaphoretics	...
Bloody flux	93	Diaphragm	...
Bodily defects	16	Diarrhea	...
Body heat, Maintenance of	25	Digestion	...
Bony deposits	107	Diseases, prevention of simple	...
Brain	38	rules for	55
Bran	28	Disinfectants	...
Breathing	47	Dislocaetions	...
Breeding	19	Diuretics	...
Bull burnt	99	Drink	...
Bulls, stud	15	Dropsy	...
		Drugs, vegetable	...
		Drugs, mineral	...
		Dysentery	...
C	PAGE.	E	
Calculi	96	Ear	...
Calf	102	Eliminatives	...
Calomel	69	Empirical practice	...
Calving, dropping after	104	Enema	...
Camphor	65	Ensilage	...
Cancer of the horn	110		
Cantharides	71		
Carbolic acid	69		
Carbuncles and Anthrax fever	73		
Cardamoms	64		
Castor oil	65		

PAGE.	I	PAGE.
Enteritis 94		
Epilepsy 81		
Epsom Salts 70	Ill-health, signs of	46
Examination of Cattle 15	Impaction of the rumen ...	90
Excretions 48	Impaction of the third stomach	91
Expectorants 62	Indian cattle "	10
Eyes 39	Infections	27
	Inflammation of the brain ...	81
	" lungs ...	85
	Inoculation	9
	Intestines	48
	Inversion of the bladder ...	103
	" uterus ...	103
	" vagina ...	102
	Iron sulphate ...	70
		J
	Jaggery	67
	Jaundice	95
	Jowari	26
		K
	Kathiawar cattle	12
	Kidneys	45
	Kultie	27
	Kusumba	27
		L
	Lead acetate	70
	Legumes	27
	Leucorrhœa	99
	Lime	70
	Linseed oil	67
	Liver	48
	Lucerne	26
	Lumpy jaw	111
	Lungs	41
		M
	Malignant sore throat ...	72
	Mamme	38
	Mammitis	105
	Mange	113
	Mangers	36
	Manioc	27
	Measures	71
	Meat	119
	Membranes, retention of ...	22
	Metritis	104
	Milk	120
	Milkers	17
	Mundar	115, 116
	Mung	27
	Mustard	67
	Mysore cattle	12
		H
Hæmatinics 62		
Hæmo-albuminuria 82		
Heart 40		
Hefting 18		
Hernia 111		
Hissar cattle 12		
Hoose 24		
Horns 38		
Hoven 90		
Husk 24		

N	PAGE	PAGE.	
Narcotics ...	63	Roots ...	27
Navel-ill ...	23	Rumen ...	42
Neem or margosa ...	67	Rumenotomy ...	91
Nellore cattle ...	11	Rumination ...	44
Nepal cattle ...	13		
Nephritis ...	96		
Neurotics ...	63		
Nitre ...	70		
Nux Vomica ...	68, 116		
O.		S	
Oesophagus ...	43	Salammoniac ...	70
Oil-cakes ...	27	Saliva ...	44
Omasum ...	42	Salt ...	70
Orid ...	27	Scour ...	24
Ophthalmia ...	114	Scrotal herina ...	112
Opium ...	68	Sedatives ...	63
Orchitis... ...	97	Seeds ...	27
Organs, structure and functions of ...	38	Sheds, cattle ...	34
Ovaries ...	45	Shelter ...	4, 50
		Sialagogues ...	62
		Silo ...	30
		Sind cattle ...	12
		Sire ...	21
		Skins ...	45
		Skit ...	93
		Slinking ...	100
		Slipping ...	100
		Spinal cord ...	38
		Spleen ...	44
		Splenic apoplexy ...	72
		Sprin ...	108
Pancreas ...	43	Sterility ...	100
Paralysis ...	80	Stimulants ...	63
Parasitic bronchitis ...	86	Stomach ...	42
Parturition ...	22, 101	Straws ...	27
Parturient Apoplexy...	104	Straw Rice ...	27
Pharynx ...	43	Straw, Kurakkan ...	27
Pleuro-pneumonia ...	76	Sulphur... ...	71
Plough cattle ...	13	Sun stroke ...	81
Polyuria ...	83, 97		
Poultices ...	53		
Pregnancy ...	100		
Pulse ...	47		
Puncturing the rumen ...	89		
Purgatives ...	62		
Q		T.	
Quarter ill ...	72	Tamarind ...	68
Quinine ...	68	Tea, Hay ...	52
		Teeth ...	16
		Temperature ...	48
		Tetanus ...	80
		Thermometer ...	48
		Thrush ...	121
		Tobacco... ...	115
		Tonics ...	62
		Tricks, sellers ...	18
		Tuberculosis ...	77
Rabies ...	78	Tumours ...	110
Hearing... ...	19, 23	Turpentine ...	68
Refrigerants ...	63	Twisting of the bowels ...	94
Respiration ...	47		
Restoratives ...	62		
Retention of the membranes ...	102		
Keticulum ...	42		
Rheumatism ...	82		
Rice ...	28		
Rinderpest ...	74	Udder ...	38
		Ulcers ...	11

PAGE.	W		
Umbilical hernia	111	Warbles	114
Uræmia	83	Waste, reparation of...	25
Uterus	45	Water	5
V		Weights ...	71
Vaccination	9	White scour ...	93
Vagina	45	Wounds ...	108
Ventilation	6		—
Ventral hernia... ...	112		
Vulva	45	Y	
		Yellows...	95

SECOND EDITION
OF
"CINERATORS AND SANITATION."

A pamphlet with 4 plans

BY

JAMES MILLS, A.V.D.

Price Re. 1.

Deputy Surgeon General M. C. Furnell, M.D., F.R.C.S., Sanitary Commissioner for Madras, writes :—

"I have read with much interest Veterinary Surgeon J. Mills' report on Cinerators for the cremation of stable refuse, dead horses, &c. There can, I think, be no doubt that from a sanitary point, his views are perfectly sound, and worthy of adoption."

* * * * *

"In my late tour I saw some capital Cinerators at work especially at Anantapur, and Tadpatri."

We have received from Veterinary Surgeon James Mills, M.R.C.V.S., A.V.D., a copy of a pamphlet entitled "Cinerators and Sanitation," being a reprint of a paper contributed by him to the *Quarterly Journal of Veterinary Science in India* in January last.

Mr. Mills has recently taken a deep interest in matters of public sanitation and the frequent visits paid by him to the slaughter houses in Madras have not been without their advantages.

* * * * *

Mr. Mills' paper on "Cinerators and Sanitation" is a useful one. The object with which he drew it up is to show that a most dangerous system is pursued in dealing with the carcasses of animals, and that the safer plan would be to deal with them as the Hindus do with their dead.

* * * * *

There is no doubt that the plan suggested by Mr. Mills for getting rid of the dead bodies of animals is the best that could be adopted.—*Madras Standard*.

Mr. James Mills, M.R.C.V.S., A.V.D., Inspector of Cattle Diseases in the Madras Presidency, and Lecturer on Veterinary Medicine and Surgery, Agricultural College, Saidapet, has rendered valuable service to the public by his paper on Cinerators and Sanitation, which was originally published at the beginning of this year in the *Quarterly Journal of Veterinary Science in India*, and which has since been reprinted in pamphlet form. The value of this paper was brought to the notice of Government, who, after taking the opinion of high authorities on the subject, have wisely ordered copies of it to be distributed among a number of officials in the various districts in the Presidency who can find use for it. Mr. Mills' paper we refer to is but another proof of the practical interest which that gentleman takes in the duties of the important department to which he belongs.

* * * * *

The Cinerators which Mr. Mills proposes are not only simple and easily constructed, but are extremely cheap—a fact which leads us to hope that there will be no difficulty in carrying out, with as little delay as possible, his suggestion that these Cinerators “ought to be erected near all hospitals, cholera camps, sick lines for animals, and bazaars, for the purpose of burning everything likely to convey disease or to prove insanitary.” An important fact is that what is recommended has been tested by experience, for Mr. Mills has himself been trying Cinerators constructed on his plan, and has found them answer well. We will not enter into particulars regarding their construction, nor is it necessary for us to do so. Complete and clear instructions are given in the pamphlet we refer to, together with plans, and those who wish to know more about them can refer to the pamphlet itself.—*Madras Times*.

Veterinary Surgeon J. Mills, Government Inspector of Cattle Diseases, and Veterinary Lecturer of the School of Agriculture, has done good service in this direction to the cause of sanitation, in having published a paper on the subject of Cinerators

and Sanitation in the January number of the *Quarterly Journal of Veterinary Science*. Cattle plague has unhappily become almost perennial in India, and in many quarters has reached such alarming proportions as to very seriously affect the prosperity of the pastoral and agricultural populations of the country. Any measure, therefore, that promises to preserve property, and the means of the people's livelihood, must perforce receive full consideration at the hands of Government. And this is just such a measure. To travellers, and to the inhabitants of our rural districts, the sickening sight of scores of dead cattle is but too familiar. The difficulty of the removal and the imperfect interment of these bodies cause the seeds of further fatality to man and beast to be scattered far and wide, in such a manner as may be imagined but never accurately determined. It is a high duty, therefore, imposed on all who undertake the care of public interests, to do all that is possible to stamp out the long-crying evil of a continued spreading abroad of infected matter. Only a very little study or reflection is required to convince any one that fire offers the readiest and most efficient means for destroying the germs of disease that live with such malignant power in decomposing carcases. Mr. Mills' suggestions, if carried out, would undoubtedly lessen the evil that now exists.

* * * * *

The paper is just such an one as ought to be in the hands of every Planters' Association Honorary Secretary.—*Bangalore Spectator*.

Epitome of Vety Materia Medica and Therapeutics, by T. J. Symonds, V. S., A. V. D., and James Mills, V. S., A. V. D., with weights and measures, posological tables and index to Veterinary medicines. Price Rs. 2-8-0.

These two works, published by the Madras Government, are the joint production of two officers of the Army Veterinary Department, one of whom is the Lecturer on Zoology and Veterinary Medicine and Surgery at the Agricultural College, Saidapet, in that Presidency. The first of the works forms one of the Madras Science Primers, and is published by order of the Director of Public Instruction. It is intended as an introduction to the systematic study of Veterinary Medicine, and has been compiled for the use of the students of the above

mentioned college. Though in its compilation recourse has been had to various standard works with which the Veterinary profession is acquainted in this country, yet the addition of drugs indigenous to India renders the work more valuable than any of these to the student and practitioner in that country. The arrangement is convenient, and, so far as we can see, there are very few errors.

The second work appears to be merely a separate reprint of the concluding portion of the first, presented in this form for convenience. The two authors deserve much praise for the excellent manner in which they have accomplished their task.

The Pharmacopœia is a model of terseness and completeness ; the Appendix, containing the natural orders of medicinal plants, with their essential characters, and other information, forming a most useful complement to the *materia medica* and therapeutic section. The work can be highly commended, and as strongly recommended to members of the profession, not only in India, but in this country.—*The Veterinary Journal*, 1886.

Indian Stock-Owner's Manual. Translated into Tamil.

The Indian Government is at last rousing up to its duty to the Agriculturists of India, and is endeavouring to assist them in keeping their flocks and herds free from disease, and teaching them how to cure them when they are ill. Veterinary and Agricultural schools are established in the different Presidencies, and in each of these there is a member of our profession to instruct in veterinary matters. These instructors are drawn from the Army Veterinary Department, and some of them have greatly distinguished themselves in this direction by their teaching and writings. Among the foremost of these is the author of the above work, who, in addition to being lecturer on Zoology and Veterinary Medicine and Surgery in the Madras Agricultural College, is also Inspector of Cattle Diseases in that Presidency. The manual which he has prepared is in the Tamil language, and is intended for the Cattle-owners of Southern India whose stock suffer from almost every conceivable disease. A portion of the work had already appeared in 1883, as “Plain Hints on the Diseases of Cattle in India.” For the purpose, nothing could be better than the plan and style which the author has adopted, and if those for whom the book is written will only follow out the direction so clearly given, they and their country must greatly benefit. The most serious

difficulty to be encountered in the suppression of contagious diseases of the most fatal kind, is the religious aversion of the natives to destroy animals, and this Mr. Mills has done his best to overcome. Another drawback is their objection to cutting up the bodies of dead animals, which is a great hindrance to making autopsies ; and here, again, he points out the utility of the practice, and how religious scruples may be respected while *post mortem* examinations are made.—*The Veterinary Journal*, 1885.

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